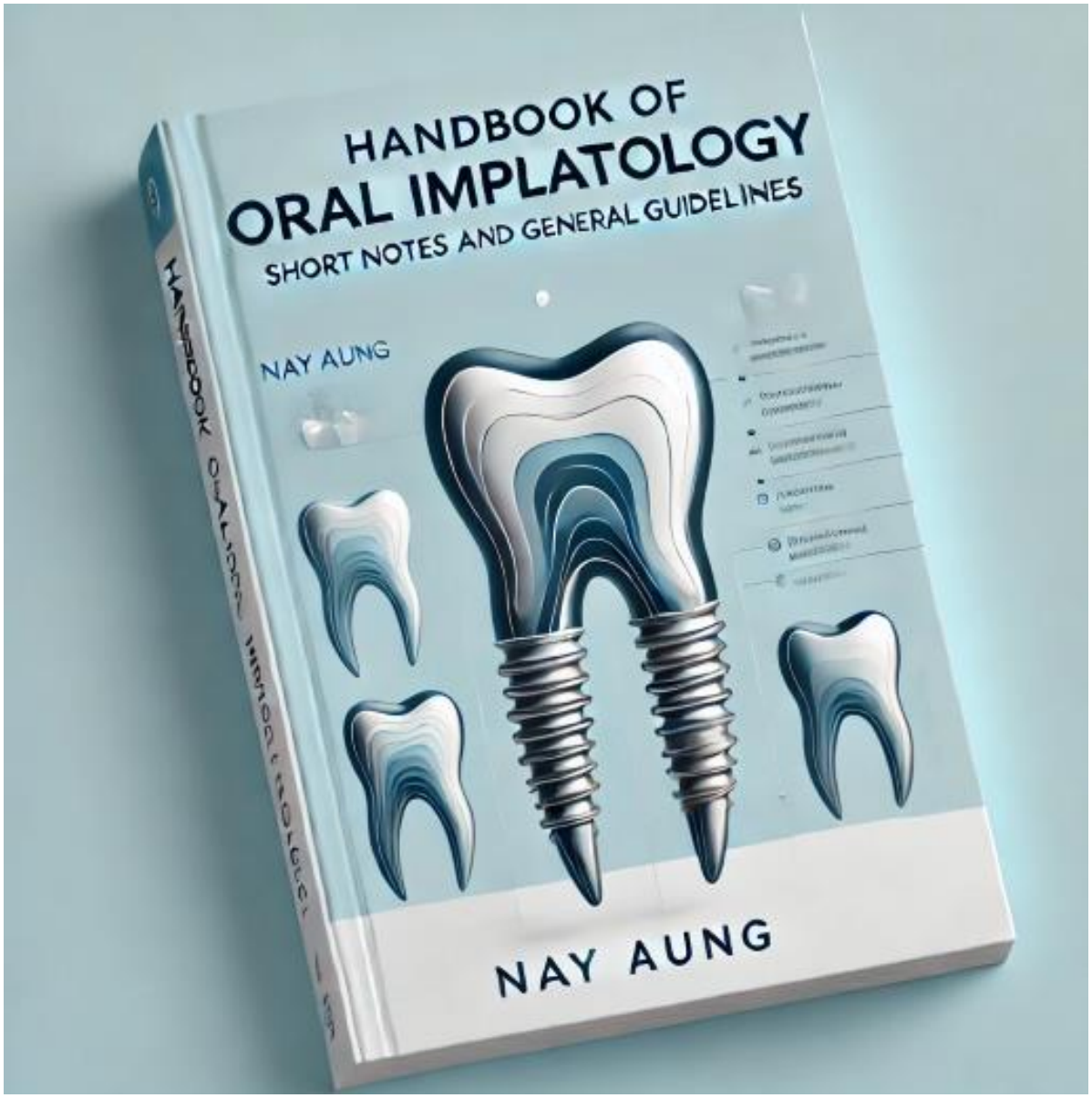
Handbook of Oral Implantology

Short Notes and General Guidelines



အမှာစာ

ဒီစာအုပ်လေးကို သွားမြစ်တုကုသမှုပြုလုပ်ဖို့ စတင်လေ့လာနေကြတဲ့ သွားနှင့်ခံတွင်းဆရာဝန်များအတွက်သာ ရည်ရွယ်ရေးသားထားပါတယ်။ Basic Dental Implant Treatment Hands-on Training Course တွေမှာ အသေးစိတ်ဆက်လက်လေ့လာပြီးမှသာ သွားမြစ်တုကုသမှုကို ပြုလုပ်သင့်ပါတယ်။

Implant Treatment မလုပ်ခင်မှာ သိထားသင့်တဲ့ အကြောင်းအရာတွေကို စုစည်းဖော်ပြပေးထားခြင်းသာဖြစ်ပါတယ်။ ဒီစာအုပ်လေးမှာ ဖော်ပြထားတဲ့ အချက်အလက်တွေကို ဖတ်ရှုမိပြီး ခေါင်းစဉ်တစ်ခုချင်းစီကို ကျယ်ကျယ်ပြန့်ပြန့် ဆက်လက်လေ့လာစေချင်ပါတယ်။

ဒီစာအုပ်ထဲလေးမှာ short notes and general guidelines များကိုသာ ဖော်ပြထားတာ ဖြစ်ပါတယ်။ အသေးစိတ်ကို သိလိုတဲ့အခါ သက်ဆိုင်ရာ textbook တွေနဲ့ နောက်ဆုံးထွက်ရှိထားတဲ့ သုတေသနစာတမ်းတွေ၊ treatment guideline တွေကို ဆက်လက်လေ့လာနိုင်ပါတယ်။

ဒီစာအုပ်မှာ ဖော်ပြထားတဲ့ ခေါင်းစဉ်တစ်ချို့ကို စာဖတ်သူတွေ သတိထားမိဖို့အတွက်သာ ဖော်ပြထားတာဖြစ်လို့ တကယ့်အနှစ်သာရနဲ့ ကုသမှုသဘောတရား၊ ကုသမှုဆိုင်ရာရည်ရွယ်ချက်တွေကို မှန်မှန်ကန်ကန် သိရှိနိုင်ဖို့ သက်ဆိုင်ရာစာအုပ်စာတမ်းတွေမှာ အသေးစိတ် ဖတ်စေချင်ပါတယ်။ ဒါ့အပြင် ဆေးပညာသဘောတရားတွေဟာ အချိန်နဲ့အမျှ ပြောင်းလဲသွားတတ်တာမို့ အမြဲမပြတ်လေ့လာသင်ယူနေဖို့ လိုအပ်ပါတယ်။

စာရေးသူရဲ့ ရည်ရွယ်ချက်ဟာ ဒီစာအုပ်လေးကို စတင်ဖတ်မိသူအနေနဲ့ အသေးစိတ် အကြောင်းအရာတွေကို ပိုမိုသိချင်စိတ်ဖြစ်ပေါ်လာပြီး ဆက်လက်လေ့လာချင်တဲ့ စိတ်ဆန္ဒတွေ ဖြစ်ပေါ်လာစေဖို့သာ ဖြစ်ပါတယ်။ ဒီစာအုပ်လေးမှာ ဖော်ပြထားတဲ့ အချက်အလက်တွေဟာ အကြမ်းဖျဉ်းသဘောတရားတွေသာဖြစ်ကြောင်း သတိပေးပါရစေ။ သွားမြစ်တုကုသမှုကို အခက်အခဲမရှိ ပြုလုပ်နိုင်ကြပါစေ။

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June 24, 2024

မာတိကာ

1. History and Future of Implant Dentistry

ယနေ့ခေတ် သွားနှင့်ခံတွင်းဆေးပညာလောကမှာ သွားမြစ်တုနည်းပညာဟာ အလျင်အမြန် တိုးတက်နေပါတယ်။ သွားမြစ်တုကို အရိုးထဲမှာ သွားအမြစ်အနေနဲ့ အစားထိုးထည့်လိုက်ပြီး အပေါ်ဘက်ကနေ သွားတုပိုင်းကို တပ်ဆင်ပေးလိုက်ခြင်းအားဖြင့် သွားမရှိတဲ့နေရာမှာ သွားစိုက်ကြပါတယ်။ အရိုးထဲမှာ နစ်မြုပ်နေတဲ့ အပိုင်းကို fixture၊ fixture အပေါ်မှာ သွားတုတပ်ဆင်လို့ရအောင် ကြားခံဆက်ပေးထားတဲ့အပိုင်းကို abutment၊ အပေါ်ဆုံးမှာတော့ သွားတုcrownကို တပ်ဆင်မှာ ဖြစ်ပါတယ်။

သွားမြစ်တုကုသမှုကို ထိထိရောက်ရောက် အောင်မြင်စေခဲ့တဲ့ အချက်(၄)ချက်ကို ဖော်ပြချင်ပါတယ်။ အဲ့ဒါတွေကတော့ two basic biomaterials (titanium and aluminum oxide), CBCT, osseointegration, biological or transmucosal seal of the gingival tissues around the implant neck တို့ ဖြစ်ပါတယ်။ သွားမြစ်တုကုသမှုဟာ အခြားသွားစိုက်နည်းတွေထက် ပိုကောင်းတဲ့အချက်တွေ ရှိပါတယ်။ Increasing in bone anchored support, preventing bone resorption, maintaining healthy teeth without the use of burs အစရှိသဖြင့် ဖြစ်ပါတယ်။

သွားမြစ်တုကုသမှုကဲ့သို့သော သဘောတရား၊ အယူအဆတူညီတဲ့ ကနဦးကုသမှုတွေကို ရှေးခေတ် အီဂျစ်လူမျိုးတွေ အသုံးပြုခဲ့တာ တွေ့ရပါတယ်။ သွားမရှိတော့တဲ့နေရာမှာ တန်ဖိုးရှိတဲ့သတ္တုတွေ၊ ကျောက်တွေနဲ့ အစားထိုးခဲ့တာ တွေ့ရပါတယ်။ ယနေ့ခေတ်သစ်မှာတော့ ၁၉၄၀ ခုနှစ်ဝန်းကျင်ကစပြီး သွားမြစ်တုကုသမှုကို ဆေးကုသမှုပေးရာမှာ အသုံးပြုခဲ့ကြပါတယ်။ စတင်အသုံးပြုချိန်မှာ အသုံးမပြုသင့်ကြောင်း ဝေဖန်တာတွေ လည်း ရှိခဲ့ပါတယ်။

၁၉၅၁ ခုနှစ်မှာ Mr. Linkow က American Academy of Implant Dentistry ကို ဖွဲ့စည်းဖို့ လှုံ့ဆော်ခဲ့သလို အဲ့ဒီနှစ်အစပိုင်းမှာပဲ Dr. Branemark ကလည်း သွားမြစ်တုနဲ့ဆိုင်တဲ့ သုတေသနကို ဆွီဒင်မှာ ပြုလုပ်နေခဲ့ပါတယ်။ ဂျပန်နိုင်ငံမှာတော့ Mr. Kawahara က ceramic implant ကို ၁၉၇၀ ခုနှစ်အစပိုင်းမှာ တီထွင်နေခဲ့ပါတယ်။ ယနေ့ခေတ် Contemporary Oral Implantology ကို ဟားဗတ်ဒ်တက္ကသိုလ်မှာ ကျင်းပတဲ့ 1978 conference မှာ အစပြုခဲ့ကြပါတယ်။

Titanium implant ကို Dr. Branemark ဦးဆောင်တဲ့အဖွဲ့က စတင်အသုံးပြုခဲ့တာ တွေ့ပါတယ်။ သုတေသနရလဒ်တွေကနေ titanium implant ဟာ အရိုးထဲမှာ ထည့်ဖို့ သင့်တင့်ကြောင်း ဖော်ထုတ်နိုင်ခဲ့ပါတယ်။ ၁၉၈၁-၂ခုနှစ်မှာ cylindrical type implant ကို အမေရိကန်မှာ စတင်အသုံးပြုခဲ့ကြပါတယ်။ Hydroxyapatite coated implant ကို ၁၉၈၄ ခုနှစ်မှာ စတင်မိတ်ဆက်ခဲ့ပါတယ်။

သွားမြစ်တုတွေကို အမျိုးအစားအမျိုးမျိုး ခွဲခြားသတ်မှတ်ကြလေ့ရှိပါတယ်။ Shape, place of anchorage, composition, coating စတာတွေအပေါ် မူတည်ပြီး ခွဲခြားသတ်မှတ်ကြတာဖြစ်ပါတယ်။ Endosseous implants, subperiosteal implants, transosseous implants စသဖြင့် ရှိတဲ့အနက် ယနေ့ခေတ်မှာတော့ endosseous implants ကို အများဆုံး အသုံးပြုနေကြပါတယ်။ သွားမြစ်တုရဲ့မျက်နှာပြင်တွေကို

ခွဲခြားကြည့်ရင် smooth, machined, textured, coated စသဖြင့် တွေ့ရပါတယ်။ သွားမြစ်တုရဲ့ body design ကို ကြည့်မယ်ဆိုရင် cylinder, thread, plateau, perforated, solid, hollow စသဖြင့် တွေ့ရပါတယ်။

Root Analogue Implants (RAI)

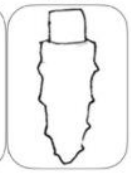
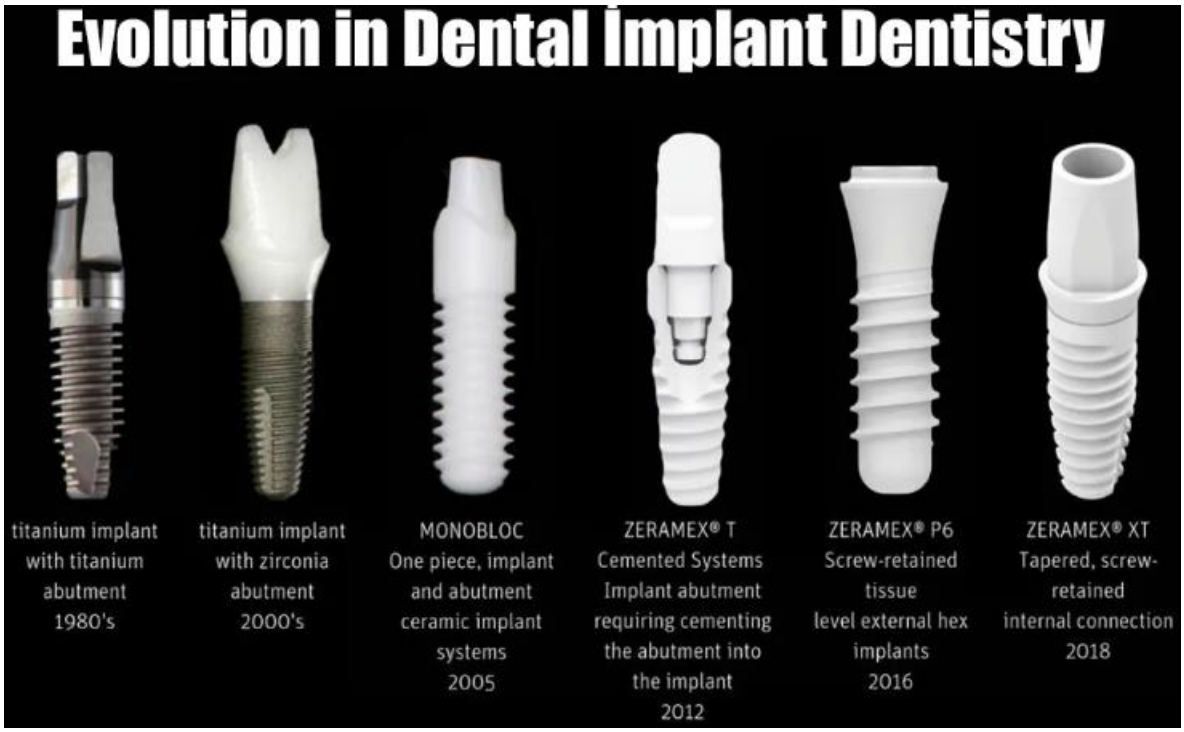
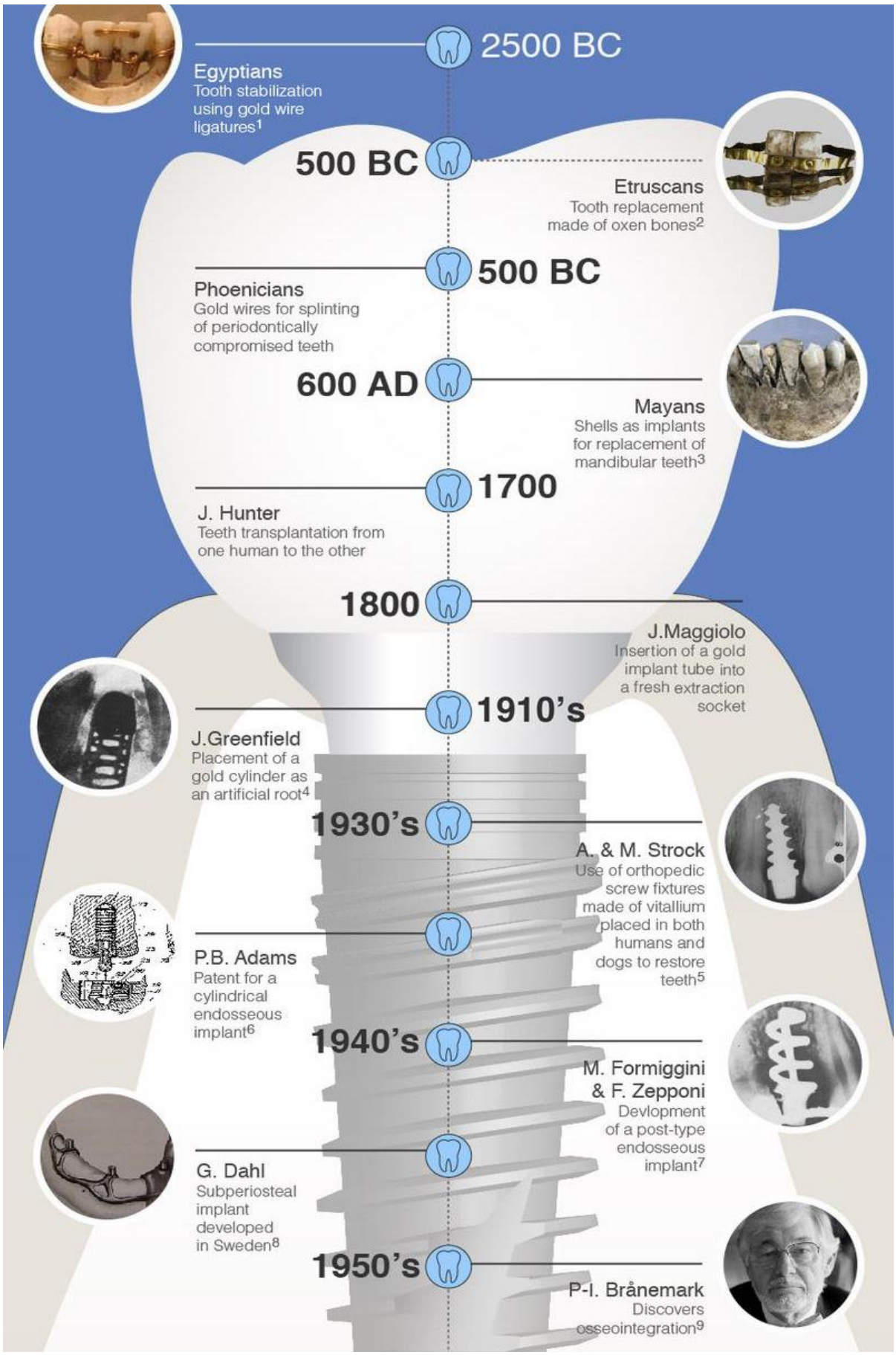
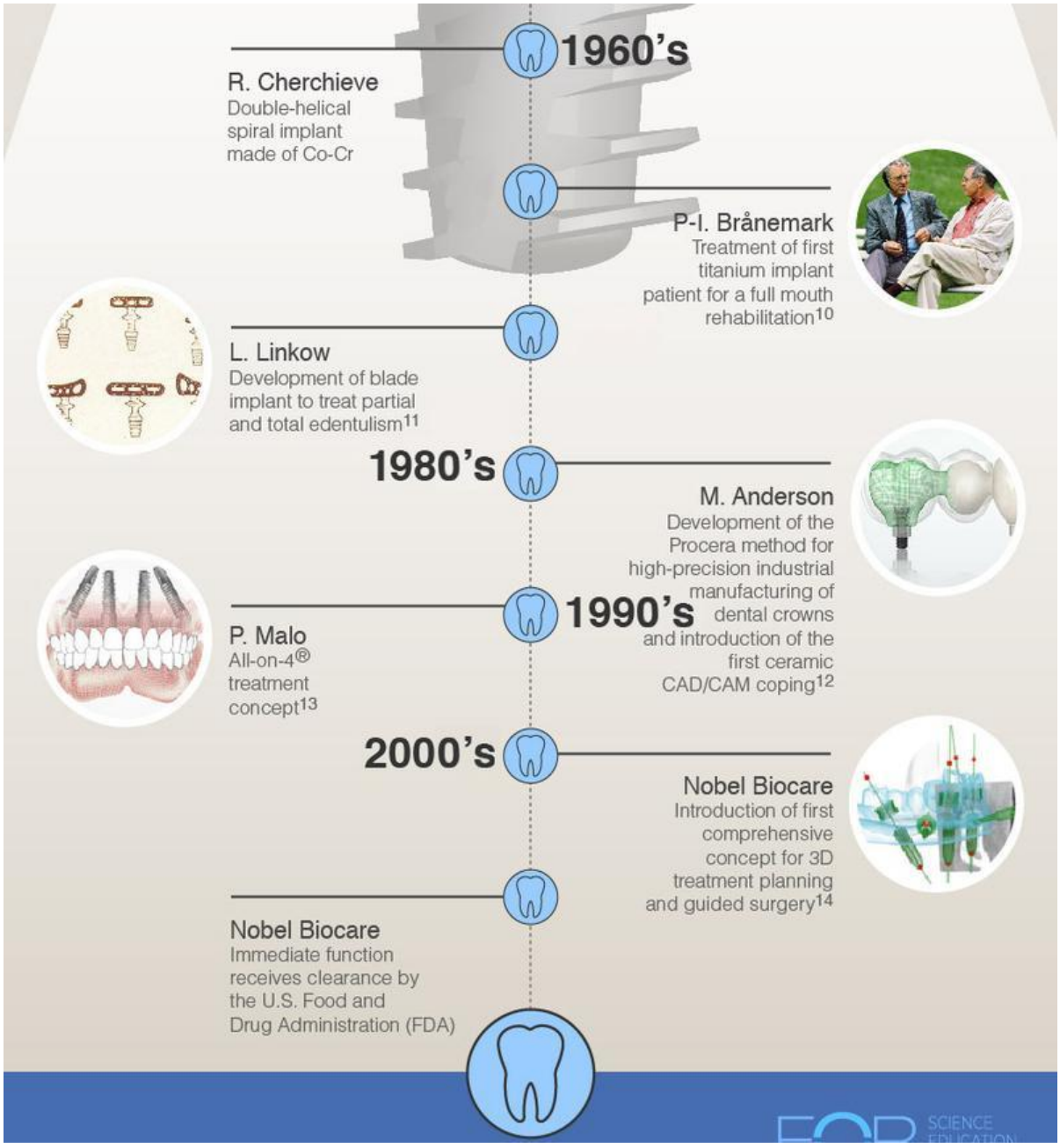
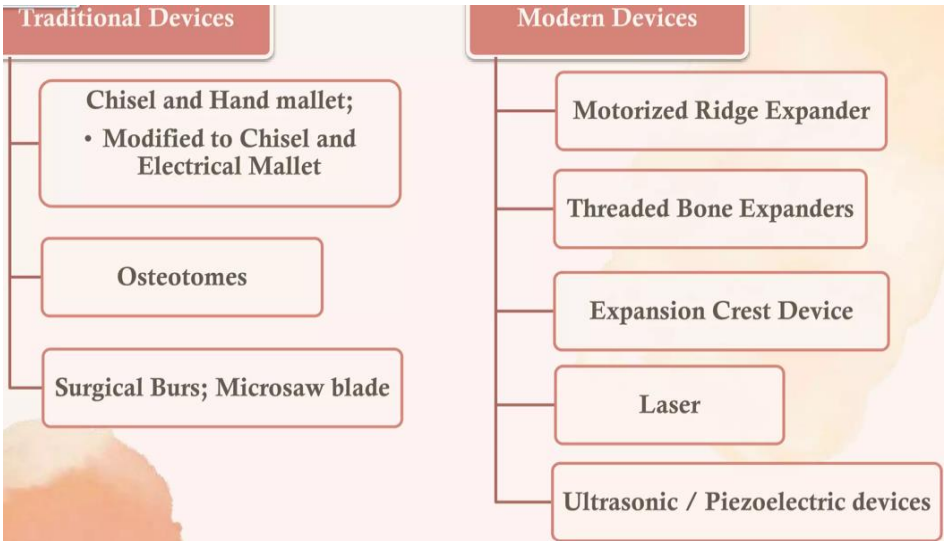
Year	1969	1992	1997	2007	2008	2011	2016	2016	2016
Name	**The Dental Polymer Implant Concept**	**The Root Analogue Titanium Implants**	**The Re Implant® System**	**BioImplant**	**The DLMS Implants**	**CAD/CAM fabricated Titanium RAI**	**The Replicate™ System**	**3D printed RAI**	**Root Analogue Zirconia Implant**
Version	No image available								
Material	Polymer	Titanium	Titanium	Zirconia	Titanium	Titanium	Titanium/ Zirconia	Zirconia	Zirconia
Fabrication	Post extraction	Post extraction	Post extraction	Post extraction	Prior to extraction	Prior to extraction	Prior to extraction	Prior to extraction	Post extraction
Surface treatment	Corund-blasted	None	Air-abraded (Aluminum oxide) Acid-etched	Corund-blasted	Acid-etched	None	Air-abraded (Corundum) Acid-etched	None	Corund-blasted
Number of parts	One-piece	Two-piece	Two-piece	One-piece	One-piece	One-piece	One-piece	One-piece	One-piece
Clinical application	+	-	+	+	+	-	+	-	+
Immediate loading	-	-	-	-	-	-	-	-	-
Insertion technique	Tapping into the socket								

Fig. 1. Diagram of root analogue implants since the beginning of their development until today.




2500 BC
Egyptians
Tooth stabilization using gold wire ligatures[1]
500 BC
Etruscans
Tooth replacement made of oxen bones[2]
500 BC
Phoenicians
Gold wires for splinting of periodontically compromised teeth
600 AD
Mayans
Shells as implants for replacement of mandibular teeth[3]
1700
J. Hunter
Teeth transplantation from one human to the other
1800
J.Maggiolo
Insertion of a gold implant tube into a fresh extraction socket
1910's
J.Greenfield
Placement of a gold cylinder as an artificial root[4]
1930's
A. & M. Strock
Use of orthopedic screw fixtures made of vitallium placed in both humans and dogs to restore teeth[5]
P.B. Adams
Patent for a cylindrical endosseous implant[6]
1940's
M. Formiggini & F. Zepponi
Devlopment of a post-type endosseous implant[7]
G. Dahl
Subperiosteal implant developed in Sweden[8]
1950's
P-I. Brånemark
Discovers osseointegration[9]


1960's
R. Cherchieve
Double-helical spiral implant made of Co-Cr
P-I. Brånemark
Treatment of first titanium implant patient for a full mouth rehabilitation[10]
L. Linkow
Development of blade implant to treat partial and total edentulism[11]
1980's
M. Anderson
Development of the Procera method for high-precision industrial manufacturing of dental crowns
1990's
and introduction of the first ceramic CAD/CAM coping[12]
P. Malo
All-on-4® treatment concept[13]
2000's
Nobel Biocare
Introduction of first comprehensive concept for 3D treatment planning and guided surgery[14]
Nobel Biocare
Immediate function receives clearance by the U.S. Food and Drug Administration (FDA)

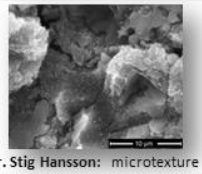

Traditional Devices
Chisel and Hand mallet;
• Modified to Chisel and Electrical Mallet
Osteotomes
Surgical Burs; Microsaw blade
Modern Devices
Motorized Ridge Expander
Threaded Bone Expanders
Expansion Crest Device
Laser
Ultrasonic / Piezoelectric devices

The History of Dental Implants

Ancient Egyptians use shells and ivory to replace missing teeth

Roman dental work, a fixed prosthesis.

The first titanium "roots" are implanted in a patient



Dr. Stig Hansson: microtexture surface improve load distribution and helps retain crestal bone

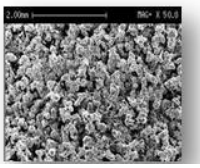
Thommen Medical introduces hydrophilic surface which speeds early osseointegration

@2000 B.C	@600 B.C	100-200 A.D.	1951	1965	1981	Mid '80's	Late '90's	2011

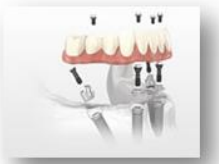
Ancient Mayan dental implants false teeth made from shells "implanted" into the lower jaw.

Per-Ingvar Branemark An orthopedic surgeon discovers that titanium metal can "fuse" to bone

Schroeder and Ledermann introduce titanium plasma spray (TPS)



All on Four Implant technique introduced,



All-on-4

DENTAL IMPLANT PROCEDURE

You might think that dental implants are a relatively new procedure given their recent rise in popularity. In actuality, they have been around in some form since the mid 20th century. Let's take a look back at where it all started...

1950s & 60s

Swedish professor, Per-Ingvar Brånemark, discovers that it is possible for human bone to fuse with titanium as it grows.

Brånemark performs the very first full mouth dental implantation. Multiple teeth attached to an implant (instead of one implant per tooth) distributed the force of chewing around the mouth, making longer-lasting implants.

1965

1990s

A technique is developed to avoid anatomical limitations the back of the upper and lower jaws pose. The back implants are angled in a way that only leaves enough room for two more implants in the front.

1998

Dr. Paulo Malo determines that instead of 6 to 12 implants for a row of teeth in one jaw, you only needed 4 for an entire set of teeth on the upper and lower jaw. Hence the name All-on-4®; all teeth on four implants.

2004

Nobel Biocare, one of the largest dental implant manufacturers, launches the All-on-4® treatment concept with custom-designed components.

2014

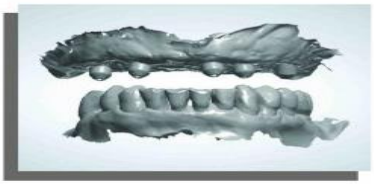
The Journal of Clinical & Diagnostic Research said the 5-year "survival rate" of 242 All-on-4® implant procedures was 98%. Survival rate means that the implants didn't cause infection and the prosthetic teeth didn't crack from use.

2016

With over 30 clinical studies published and more than 100 000 patients treated with the All-on-4® treatment concept, the approach is well validated.

2019

Technological improvements now allow the teeth and smile on an All-on-4 bridge to be designed and fabricated completely digitally.



Today

A full-arch implant is now an outpatient procedure. Patients can leave the dental office on the same day with an entirely new set of teeth, including the extraction process. Hundreds of thousands of people around the world have benefitted from All-on-4® implants.

All-on-4® Implants

History of Implant Dentistry

သွားမြစ်တုနဲ့ပတ်သက်တဲ့ သမိုင်းကြောင်းနဲ့ အနာဂတ်အလားအလာကို လေ့လာခြင်းအားဖြင့် သွားဘက်ဆိုင်ရာ နည်းပညာတွေ အဆင့်ဆင့် တိုးတက်ပြောင်းလဲလာခြင်းနဲ့အတူ ကုသမှုနည်းစနစ်တွေလည်း အဆင့်မြင့်လာပြီး ကုသမှုရလဒ်တွေ ပိုမိုကောင်းမွန်လာတာကို သိရှိနိုင်ပါတယ်။ ရှေးရိုးနည်းလမ်းတွေကနေ နည်းလမ်းအသစ်တွေကို အဆက်မပြတ် ရှာဖွေနိုင်ခဲ့ကြပြီး နောင်အနာဂတ်မှာလည်း ပိုမိုကောင်းမွန်တဲ့ ကုသရေးနည်းလမ်းတွေကို အသုံးချလာနိုင်ကြမှာ မလွဲပါဘူး။ အနာဂတ်မှာ ဘာတွေ တိုးတက်လာမယ်ဆိုတာကို ခန့်မှန်းထားနိုင်ရင် အဲ့ဒီအတွက် ကြိုတင်ပြင်ဆင်တဲ့အနေနဲ့ သိသင့်သိအပ်သော အတတ်ပညာတွေကို စဉ်ဆက်မပြတ် လေ့လာထားခြင်းအားဖြင့် မိမိရဲ့ ပညာရပ်ပိုင်းဆိုင်ရာတိုးတက်မှုအတွက်ရော၊ လူနာများအတွက်ပါ အကျိုးများစေမှာ ဖြစ်ပါတယ်။ ဒီလို နည်းပညာတွေ၊ ကုသမှုနည်းလမ်းတွေကို ရှာဖွေနိုင်ခဲ့ခြင်းဟာ နယ်ပယ်ပေါင်းစုံက ပညာရှင်တွေရဲ့ ပူးပေါင်းဆောင်ရွက်မှုနဲ့ သုတေသနတွေကြောင့်ဆိုတာကိုလည်း သိစေချင်ပါတယ်။ သမိုင်းကြောင်းနဲ့ တိုးတက်လာပုံအဆင့်ဆင့်ကို သိရှိနားလည်ထားခြင်းအားဖြင့် ပညာရပ်နဲ့ အတိမ်အနက်ကို ပိုမိုသိရှိလာပြီး ဆက်လက်လေ့လာလိုစိတ်ကို ပိုမိုဖြစ်ပေါ်စေမှာ ဖြစ်ပါတယ်။

Ancient Times

- **Early Attempts:**
  - Early dental implants date back to ancient civilizations, including the Mayans, who used shells and stones as tooth replacements.
  - Archeological evidence shows rudimentary attempts at osseointegration in ancient Egypt and China.

Modern Era

- **1952:**
  - Per-Ingvar Brånemark, a Swedish orthopedic surgeon, discovered the process of osseointegration, where titanium could bond with bone.
- **1965:**
  - Brånemark placed the first titanium dental implant in a human volunteer, marking the beginning of modern implantology.

Technological Advancements

- **1970s-1980s:**
  - Development of new materials and surface treatments to enhance osseointegration.
- **1980s-1990s:**
  - Introduction of computer-aided design/computer-aided manufacturing (CAD/CAM) technology for precision in implant placement and prosthetics.

Mainstream Adoption

- **Late 20th Century:**
  - Dental implants became widely accepted as a standard treatment option for tooth replacement.

- Increased success rates and long-term studies demonstrating their effectiveness solidified their place in restorative dentistry.

Future of Implant Dentistry

Digital Dentistry

- **Continued Integration:**
  - Continued integration of digital technologies, including 3D imaging, CAD/CAM, and digital workflows, to enhance precision and efficiency.
  - Use of artificial intelligence (AI) for predictive analytics and personalized treatment planning.

Advanced Materials

- **Development:**
  - Development of new biomaterials that promote faster and more robust osseointegration.
  - Use of bioactive coatings and surface modifications to improve implant stability and longevity.

Regenerative Techniques

- **Incorporation:**
  - Incorporation of tissue engineering and regenerative medicine to improve bone and soft tissue regeneration around implants.
  - Use of growth factors and stem cell therapy to enhance healing and integration.

Minimally Invasive Procedures

- **Advancements:**
  - Advancements in surgical techniques to reduce patient discomfort and recovery time.
  - Use of computer-guided surgery and robotics for minimally invasive and highly accurate implant placements.

Patient-Specific Solutions

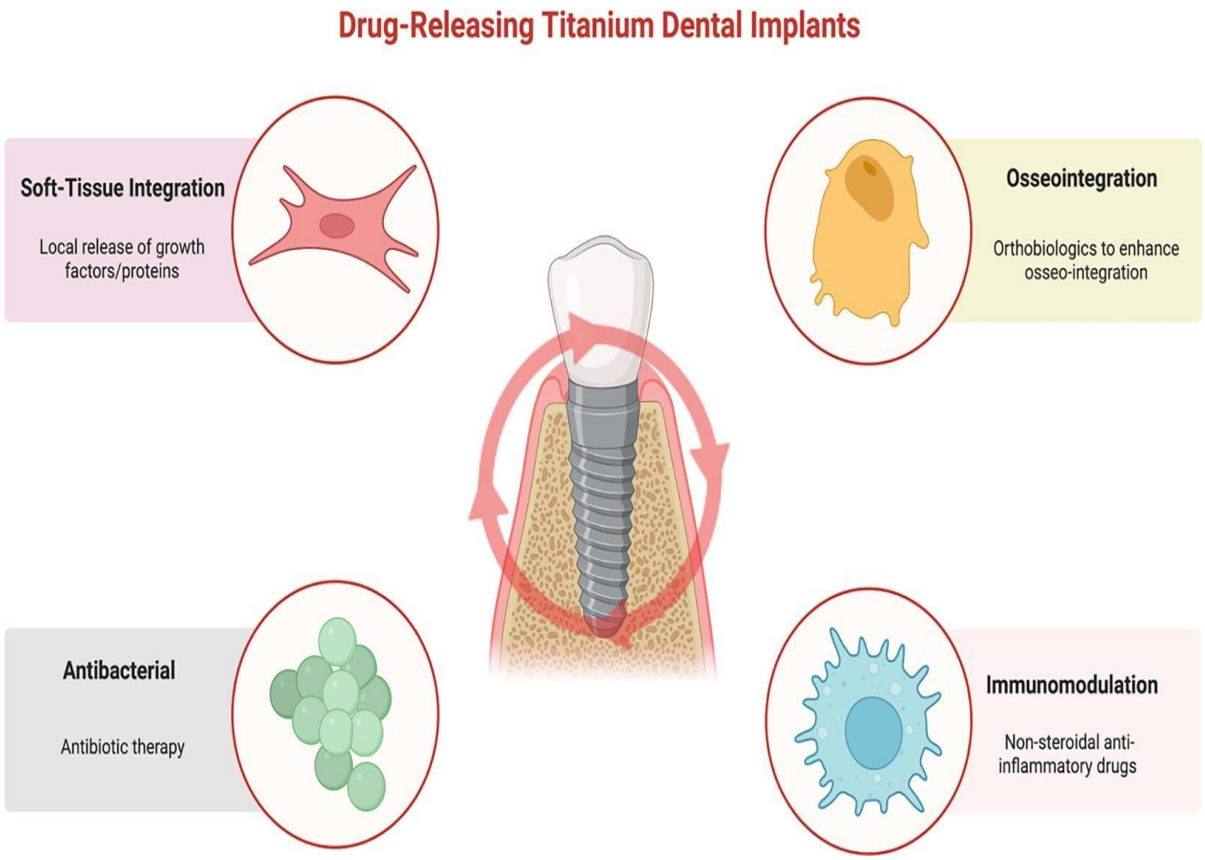
- **Customization:**
  - Customization of implants and prosthetics based on individual anatomical and functional needs.
  - Adoption of 3D printing technology for on-demand fabrication of patient-specific components.

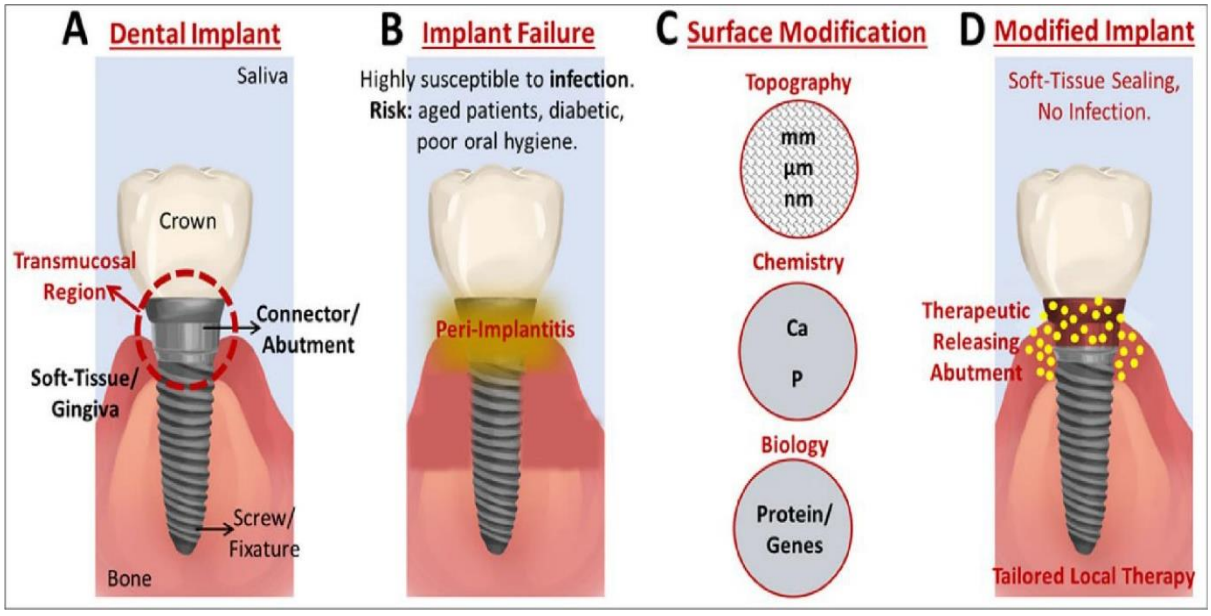
Global Accessibility

- **Efforts:**
  - Efforts to make implant dentistry more accessible and affordable worldwide.
  - Training and education initiatives to expand the availability of implant services in underserved regions.

Longevity and Maintenance

- **Research:**
  - Research focused on improving the long-term success and maintenance of dental implants.
  - Development of advanced diagnostic tools for early detection and management of peri-implant diseases.





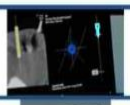
ယနေ့ခေတ်မှာ ရိုဘော့ကို အသုံးပြုပြီး သွားမြစ်တုထည့်နိုင်တဲ့ အနေအထားကို ရောက်ရှိနေပြီ ဖြစ်ပါတယ်။

Robotic Implant Placement

Remebot China			www.remebot.com.cn	Remebot
Yakebot China			www.yakebot.com/	YaKeBot
Yomi Plan Go Neocis,USA			www.neocis.com/	yomi BY NEOCIS

မေးရိုးထဲမှာ drill ဖောက်တဲ့အဆင့်ဆင့်နဲ့ သွားမြစ်တုထည့်တာကို ကွန်ပြူတာမှာ ကြည့်ရှုနိုင်ပါတယ်။

Navigation

Falcon Straumann			https://www.straumann.com/en/discover/straumann-falcon.html	straumann
IGI Image Navigation			https://image-navigation.com/	Image Navigation
Inliant Navigate Surgical			https://www.navigatesurgical.com/	inliant
Iris eped			https://www.epedmed.com/iris	eped
Navident Claronav			https://www.claronav.com/navident/	ClaroNav
x-Guide Nobel Biocare			https://www.nobelbiocare.com/en-int/x-guide	Nobel Biocare
Yomi Plan Dynamic Neocis			https://www.neocis.com/	yomi BY NEOCIS

Older and new products and companies in the field of dynamic navigation in computer assisted implant dentistry, arranged in alphabetical order.

https://mattheos.net/dynamic-and-robotic-implant-surgery/

2. Basic Knowledge for Implant Treatment

သွားမြစ်တုကုသမှုတစ်ခုအောင်မြင်ဖို့ဆိုရင် good planning and meticulous technique ရှိဖို့ လိုပါတယ်။ ကုသမှုပြီးဆုံးပီးတဲ့နောက် အောင်မြင်တဲ့ရလဒ်တစ်ခုရရှိဖို့ good planning လုပ်ရပါမယ်။ meticulous technique ဆိုတာက ကုသမှုအဆင့်ဆင့်မှာ လုပ်ဆောင်ရမယ့် procedures တွေကို ကျွမ်းကျွမ်းကျင်ကျင် လုပ်ဆောင်နိုင်ပြီး မိမိအသုံးပြုမယ့် ကိရိယာတွေနဲ့ implant system အကြောင်းကို သေသေချာချာ လေ့လာထားပြီး ကျွမ်းကျင်နေသင့်ပါတယ်။

သွားမြစ်တုထည့်မယ့်လူနာက ကျန်းမာရေးကောင်းမွန်နေရပါမယ်။ The patient should be medically fit to undergo the surgery. သွားမြစ်တုတစ်ချောင်း၊ နှစ်ချောင်းထည့်တာက minor surgery နဲ့တူပြီး ၅ချောင်း၊ ၆ ချောင်းထည့်တာနဲ့အမျှနဲ့ ပိုပြီး ဂရုစိုက်ဖို့ လိုအပ်ပါတယ်။ လူနာကို ကုသမှုအကြောင်း၊ ဖြစ်လာနိုင်တဲ့ အခြေအနေတွေအကြောင်း သေသေချာချာ ရှင်းပြထားပြီး informed consent ယူထားဖို့ လိုအပ်ပါတယ်။ တစ်ချို့ကုသမှုတွေမှာ planning အဆင့်မှာတုန်းက ထည့်သွင်းမစဉ်းစားထားတဲ့ hard and soft tissue augmentation တွေ လုပ်ဖို့ လိုအပ်တာတွေ ရှိလာနိုင်ပါတယ်။

ကုသမှုပေးမယ့် သွားဆရာဝန်အနေနဲ့ စိုက်မယ့်သွားမြစ်တုအရေအတွက်၊ အရွယ်အစား၊ စိုက်မည့်နေရာတို့ကို ရှင်းရှင်းလင်းလင်း သိမြင်ထားရပါမယ်။ ကုသမှုအတွက် တွက်ချက်လေ့လာထားမှု ရှိရမှာဖြစ်သလို၊ ဖြစ်လာနိုင်တဲ့ အခြေအနေအရပ်ရပ်ကိုလည်း ဖြေရှင်းနိုင်ရမှာ ဖြစ်ပါတယ်။ Medical contraindications တွေ၊ intra-oral contraindications တွေ၊ psychological contraindications တွေ ရှိနေပါက သေချာလေ့လာသုံးသပ်ပြီးမှ လိုအပ်သလို ကုသမှုပေးသင့်ပါတယ်။

ကုသမှုပြုလုပ်နေစဉ်အတွင်း CBCT ကို အချိန်မရွေးကြည့်လို့ရအောင် ဖွင့်ထားသင့်ပါတယ်။ Surgical stent အသုံးပြုခြင်းဟာ သွားမြစ်တုကို မိမိထည့်ချင်တဲ့ direction အတိုင်း ထည့်လို့ ရစေပါတယ်။

Advantages of Surgical Stent

Precision and Accuracy: Ensures accurate placement of implants in the desired position and angle, minimizing the risk of errors.

Predictable Outcomes: Facilitates predictable surgical outcomes by pre-planning the implant position, improving the overall success rate.

Time Efficiency: Reduces surgical time by providing a clear guide for implant placement, leading to a more efficient procedure.

Patient Safety: Decreases the risk of damaging adjacent anatomical structures, such as nerves and sinuses, by guiding the drill and implant placement.

Aesthetic Results: Helps achieve optimal aesthetic results by positioning implants accurately in relation to the surrounding teeth and bone.

Reduced Post-Operative Complications: Minimizes post-operative complications and enhances healing by ensuring precise implant placement.

Enhanced Communication: Improves communication between the dental team members, including surgeons, restorative dentists, and laboratory technicians, through a standardized guide.

သွားမြစ်တုကုသမှုကို အများအားဖြင့် ထုံဆေးနဲ့ ပြုလုပ်နိုင်ပါတယ်။ လူနာတစ်ချို့ကိုတော့ sedation or general anesthesia ပေးပြီး ကုသနိုင်ပါတယ်။ အရမ်းစိုးရိမ်တတ်တဲ့လူနာတွေကို မခွဲခင် တစ်နာရီအလိုမှာ benzodiazepine 5-20mg ပေးနိုင်ပါတယ်။

Premedication for Dental Implant Placement in Anxious Patients

Anxiolytics: Benzodiazepines (e.g., Diazepam, Lorazepam) are commonly used to reduce anxiety. Administered the night before and/or one hour before the procedure.

Non-Benzodiazepine Anxiolytics (e.g., Buspirone) as an alternative for patients with contraindications to benzodiazepines.

Sedatives:

Oral Sedatives: Mild sedatives like Triazolam can be given one hour before the procedure.

Intravenous Sedation: For higher levels of anxiety, IV sedation with medications such as Midazolam can be used.

Analgesics: Pre-emptive analgesics (e.g., Ibuprofen, Acetaminophen) to manage pain and enhance comfort.

Antibiotics: Prophylactic antibiotics may be given to prevent infection, though not specifically for anxiety.

Local Anesthesia: Topical and injectable anesthetics to ensure the procedure is pain-free, reducing anxiety related to pain.

Nitrous Oxide: Inhalation sedation with nitrous oxide (laughing gas) for mild to moderate anxiety, providing relaxation and pain control.

Behavioral Techniques: Techniques such as guided imagery, deep breathing exercises, and reassurance to help manage anxiety without pharmacological intervention.

သွားမြစ်တုကုသမှုပေးဖို့ သန့်ရှင်းသပ်ရပ်ပြီး ရောဂါပိုးမကူးစက်နိုင်တဲ့ ဆေးခန်းနေရာနဲ့ ပိုးသတ်ထားတဲ့ ပစ္စည်းတွေကို အသုံးပြုရပါမယ်။ Infection control ရအောင် မခွဲခင်မှာ 0.2% Chlorhexidine mouthwash နဲ့ ပါးလုပ်ကျင်းစေပြီး ခံတွင်းပတ်ပတ်လည်ကို betadine နဲ့ သန့်ရှင်းပေးရပါမယ်။

သွားမြစ်တုကုသမှုပြုလုပ်ဖို့ အခြေခံလိုအပ်တဲ့ ပစ္စည်းကိရိယာတွေ၊ surgical drape kit, implant packaging, sterile physiologic saline solution, implant motor and handpiece, disposable plastic sleeve, surgical kit စတာတွေကို သေသေချာချာ ပြင်ဆင်ရပါမယ်။ ကုသမှုမလုပ်ခင်က ကြိုတင်တွက်ချက်ထားတဲ့ သွားမြစ်တု အရွယ်အစားအတိုင်း ထည့်လို့ အဆင်မပြေနိုင်တဲ့ အခြေအနေတွေ ဖြစ်လာတတ်ပါတယ်။ ဒါ့ကြောင့် မိမိ အသုံးပြုမယ့် သွားမြစ်တုရဲ့အရွယ်အစားထက် size အနည်းငယ် ပိုသေးသော၊ ပိုကြီးသော သွားမြစ်တုတွေကို အပိုဆောင်ထားသင့်ပါတယ်။ အလားတူ length ပိုရှည်သော၊ ပိုတိုသော သွားမြစ်တုတွေကို အပိုဆောင်ထားနိုင်ရင် ပိုကောင်းပါတယ်။

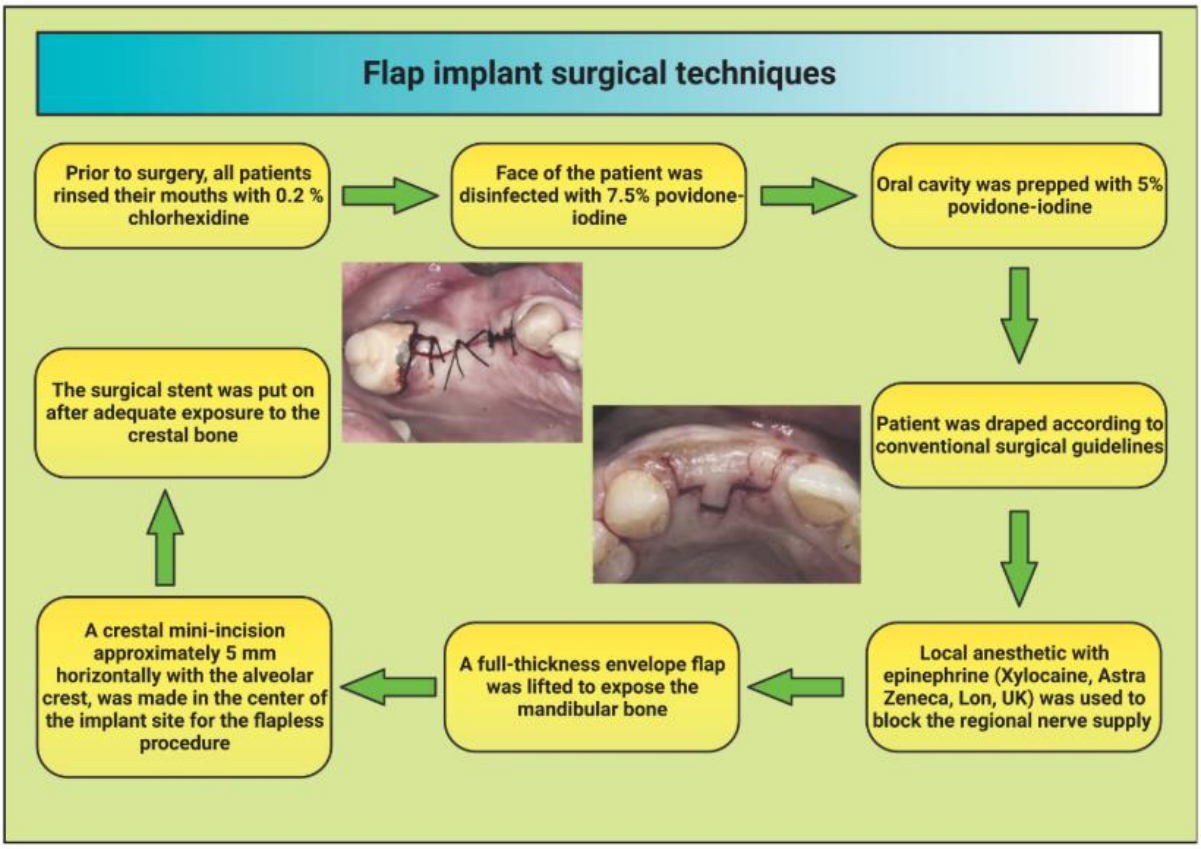


Figure 2. Shematic diagram showing the flap implant surgical techniques. This figure has been drawn utilizing the premium version of BioRender with the License number TD25NYVSSI. Image Credit: Susmita Sinha.

သွားမြစ်တုကုသမှုပြုလုပ်ရာမှာ flap design အမျိုးမျိုးကို လိုအပ်သလို အသုံးပြုနိုင်ပါတယ်။ Mid-crestal incision ကို အသုံးများပါတယ်။ မြင်ကွင်းပိုရှင်းအောင်၊ လုပ်ရတာ ကျယ်ကျယ်ဝန်းဝန်းဖြစ်အောင် vertical releasing incision ကို သုံးနိုင်ပါတယ်။

Commonly Used Flap Designs

Envelope Flap:

Description: A horizontal incision along the gingival margin without vertical releasing incisions.

Advantages: Minimal tissue trauma, good blood supply, and rapid healing.

Uses: Preferred for single implant placements and when minimal exposure is needed.

Modified Envelope Flap:

Description: Similar to the envelope flap but includes vertical releasing incisions.

Advantages: Better access and visibility of the surgical site.

Uses: Used when more extensive access is required, such as in multiple implant placements or when bone augmentation is needed.

Full Thickness (Mucoperiosteal) Flap:

Description: Involves lifting the entire thickness of the soft tissue, including the periosteum.

Advantages: Provides excellent visibility and access to the underlying bone.

Uses: Commonly used for implant placement and bone grafting procedures.

Split Thickness Flap:

Description: Only the mucosa is elevated, leaving the periosteum attached to the bone.

Advantages: Preserves blood supply to the bone, reducing the risk of bone resorption.

Uses: Typically used in soft tissue grafting procedures and in cases where minimal bone exposure is needed.

Papilla Preservation Flap:

Description: Designed to maintain the interdental papillae by making incisions that avoid cutting through the papillae.

Advantages: Maintains esthetics and reduces the risk of papilla loss.

Uses: Used in esthetically sensitive areas, particularly in the anterior maxilla.

Apically Positioned Flap:

Description: A flap that is repositioned apically to its original position after surgery.

Advantages: Increases the width of keratinized tissue and improves esthetics and function.

Uses: Used in cases requiring increased keratinized tissue around the implant site.

သွားမြစ်တုကုသမှုပြုလုပ်ရာမှာ stage I surgery ဆိုတာ implant fixture ကို အရိုးထဲ ထည့်ပြီး cover screw နဲ့အတူ သွားဖုံးသားအောက်မှာ မြှပ်ထားလိုက်တဲ့ procedure ဖြစ်ပါတယ်။ တိတိကျကျနဲ့ လိုအပ်တာထက် ထိခိုက်မှုမရှိစေဘဲ သွားမြစ်တုကို ထည့်ရပါမယ်။ Exacting, non-traumatic preparation of the recipient site, and a specific protocol ဖြစ်သင့်ပါတယ်။ ထည့်သွင်းစဉ်းစားရမယ့်အချက်တွေကတော့ quality and quantity of bone, the load demand on the final prosthesis တို့ ဖြစ်ပါတယ်။ drill နဲ့ ဖောက်နေစဉ် copious saline irrigation လုပ်ရပါမယ်။

အရိုးရဲ့ quality ပေါ် မူတည်ပြီး ထည့်မယ့် သွားမြစ်တုရဲ့ အရွယ်အစားထက် တဆင့်လျှော့ဖောက်တာ၊ တဆင့်တိုးဖောက်တာမျိုးလည်း လုပ်လေ့ရှိကြပါတယ်။ ဥပမာ - အရိုးက ပျော့လွန်းနေရင် diameter 5 mm သွားမြစ်တုအတွက် 4.5 mm အထိပဲ drill နဲ့ဖောက်ပြီး သွားမြစ်တုကို ထည့်လေ့ရှိပါတယ်။ မိမိအသုံးပြုတဲ့ implant system အရ drill များကို အစီအစဉ်အတိုင်း အသုံးပြုနိုင်ပါတယ်။ လိုအပ်ပါက countersink drill နဲ့ bone tap drill ကို အသုံးပြုပါ။ implant fixture ကို သတ်မှတ်ထားတဲ့ rpm အတိုင်း လှည့်ထည့်ပြီးပါက cover screw နဲ့ ပိတ်ပါ။ suture လုပ်ပါ။

Countersink Drill

Uses:

Widening the Osteotomy: Enlarges the coronal portion of the osteotomy to accommodate the implant's coronal design.

Creating a Seat for the Implant: Prepares a beveled space for the implant's collar, ensuring proper fit and stability.

Importance:

Enhanced Primary Stability: Improves the implant's initial stability by creating a precise fit.

Reduced Stress: Minimizes stress on the bone during implant placement, reducing the risk of micro-fractures.

Improved Healing: Promotes better osseointegration and faster healing by reducing bone trauma.

Bone Tap Drill

Uses:

Threading the Osteotomy: Creates threads in dense bone to match the implant threads.

Facilitating Implant Insertion: Reduces the insertion torque required for placing the implant in dense bone.

Importance:

Prevents Bone Compression: Reduces the risk of compressive bone necrosis by minimizing the force needed to insert the implant.

Improves Implant Stability: Ensures a secure fit of the implant threads in dense bone, enhancing primary stability.

Reduces Implant Failure: Lowers the risk of implant failure in dense bone areas by providing a precise and controlled insertion path.

သွားမြစ်တုကုသမှုပြုလုပ်ရာမှာ stage II surgery ကို soft and hard tissue healing ရပြီးနောက် mandible မှာ ၃လမှ ၄လအကြာ၊ maxilla မှာ ၄လမှ ၅လအကြာမှာ လုပ်နိုင်ပါတယ်။ Stage I မှာ တုန်းက သွားဖုံးအောက်မှာ မြှုပ်ထားတဲ့ cover screw လေးကို ပြန်ဖေါ်ပါမယ်။ ပြီးရင် သင့်တော်တဲ့ abutment ကို ရွေးချယ်တပ်ဆင်ပါတယ်။ Abutment တပ်ပီးရင် flap လှန်ထားပါက suture ပြန်လုပ်ထားပေးပါမယ်။ အများအားဖြင့် soft tissue healing ရပြီးနောက် (၂) ပတ်ကြာတဲ့အချိန်မှာ သွားတုတပ်ဆင်ဖို့အတွက် impression taking လုပ်ကြပါတယ်။

သွားမြစ်တုထည့်ပြီးနောက် အရောင်ကျဆေး၊ အကိုက်အခဲပျောက်ဆေး၊ ပိုးသတ်ဆေးတို့ကို ပေးနိုင်ပါတယ်။ သွားမြစ်တုက အာရုံကြောနဲ့ကပ်လွန်းနေရင် ယာယီထုံနေတတ်ပါတယ်။ အချိန်ကာလတစ်ခုအကြာမှာ ပြန်ကောင်းသွားပါလိမ့်မယ်။ သွားမြစ်တုထည့်ထားတဲ့ဘက်အခြမ်းမှာ ပါးအပြင်ဘက်ကနေ ရေခဲကပ်ပေးရပါမယ်။ chlorhexidine mouthwash 0.2% for 1 minute twice daily လုပ်သင့်ပါတယ်။ ဆေးလိပ်မသောက်ဖို့ လူနာကို ညွှန်ကြားရပါမယ်။

Post-Operative Instructions After Implant Surgery

Pain Management:

Medications: Take prescribed pain relievers as directed.

Over-the-Counter Options: Use ibuprofen or acetaminophen for additional pain control if needed.

Swelling Control:

Ice Packs: Apply ice packs to the outside of the face over the surgical area for 20 minutes on and 20 minutes off during the first 24 hours.

Elevation: Keep your head elevated, even while sleeping, to reduce swelling.

Bleeding Management:

Gauze Pads: Bite gently on gauze pads placed over the surgical site and replace them as needed until bleeding stops.

Avoid Disturbance: Do not rinse, spit, or use straws for the first 24 hours to avoid dislodging the blood clot.

Oral Hygiene:

Rinsing: After 24 hours, gently rinse your mouth with a saltwater solution (1/2 teaspoon of salt in 8 ounces of warm water) several times a day.

Brushing: Continue brushing your teeth, but avoid the surgical site for a few days.

Diet:

Soft Foods: Stick to soft, cool foods like yogurt, smoothies, and soups for the first few days.

Hydration: Drink plenty of fluids but avoid hot drinks and alcohol.

Activity:

Rest: Avoid strenuous activities for the first few days to promote healing.

Gradual Return: Gradually return to your normal activities as you feel comfortable.

Avoidance:

Smoking and Alcohol: Refrain from smoking and alcohol consumption as they can impair healing.

Disturbance: Avoid touching or disturbing the surgical site with your tongue or fingers.

Follow-Up:

Appointments: Attend all scheduled follow-up appointments to monitor healing and address any concerns.

Report Issues: Contact your dentist if you experience excessive bleeding, severe pain, or signs of infection (such as fever or pus).

Medication:

Antibiotics: Take any prescribed antibiotics as directed to prevent infection.

Pain Medication: Use prescribed or recommended pain medication to manage discomfort.

Emergency Contact:

Emergency Information: Know how to contact your dentist in case of an emergency or if you have any concerns.

ဆေးသောက်ဖို့ ညွှန်ကြားတဲ့အခါ အောက်ပါအချက်များကို သတိပြုပေးပါ။

Drug Doses After Implant Surgery

Pain Management

Ibuprofen: 400-600 mg every 4-6 hours as needed for pain. Maximum dose: 3200 mg/day.

Acetaminophen: 500-1000 mg every 6 hours as needed. Maximum dose: 3000 mg/day.

Combination Therapy: Alternating ibuprofen and acetaminophen can be effective.

Antibiotics

Amoxicillin: 500 mg every 8 hours for 7-10 days.

Clindamycin: 300 mg every 6 hours for patients allergic to penicillin.

Anti-Inflammatory Medications

Dexamethasone: 4-8 mg daily for 2-3 days to reduce swelling.

Mouth Rinse

Chlorhexidine Gluconate: 0.12% rinse, twice daily for 1-2 weeks to prevent infection.

Post-Surgical Care

Ice Packs: Apply intermittently for the first 24-48 hours to reduce swelling.

Soft Diet: For the first few days post-surgery to avoid disturbing the surgical site.

Special Considerations

Patient Allergies: Always consider patient-specific allergies and contraindications.

Medical History: Adjust dosages for patients with liver or kidney impairment.

Consultation: Always follow the prescribing healthcare provider's instructions.

Note

These dosages are general recommendations and should be tailored to individual patient needs. Always consult with a healthcare professional before administering any medication.

	Treatment planning (Checklist before surgery is scheduled)		✓	×
1)	Medical history	Anticoagulation	☐	☐
		Antiresorptive medication (Bisphosphonates, Denosumab)	☐	☐
		Diabetes mellitus	☐	☐
		Radiotherapy	☐	☐
		Smoking	☐	☐
		Allergies	☐	☐
2)	Periodontal pre-treatment		☐	☐
3)	Radiographs available and adequate	2D	☐	☐
		3D	☐	☐
4)	Adequate anaesthesia	Local anaesthesia	☐	☐
		Sedation	☐	☐
		ITN	☐	☐
5)	Guided Workflow	3D-Radiographs	☐	☐
		Digital impression	☐	☐
		Treatment planning initiated	☐	☐
6)	Necessary materials available	Instruments	☐	☐
		Implants	☐	☐
		Biomaterials	☐	☐
7)	Informed consent signed		☐	☐
8)	Medication prescriptions given and explained		☐	☐

	Pre-operative (Checklist before surgery)		✓	×
1)	Patient identity verified		☐	☐
2)	Update of the medical history		☐	☐
3)	Pre-surgical medications taken	Antibiotics	☐	☐
		Analgesics	☐	☐
		Steroids	☐	☐
4)	PRF/PRP necessary and prepared		☐	☐
5)	Material available, sterile, and functioning	Instruments	☐	☐
		Implants	☐	☐
		Biomaterials	☐	☐

	Post-operative (Checklist before patient is checked out)		✓	×
1)	Adequate case documentation		☐	☐
2)	Post-operative radiographs sufficient		☐	☐
3)	Post-operative patient instructions given?		☐	☐
3)	Post-operative medications given/prescribed?	Antibiotics	☐	☐
		Analgesics	☐	☐
		Steroids	☐	☐
6)	Temporary prosthesis/Haemostatic dressing material		☐	☐
8)	Schedule follow-up appointment		☐	☐
9)	Provide restorative notes to prosthetic dentist		☐	☐

1. Hygiene & Maintenance 2. Implant Final Restoration Design &Fabrication 3. Implant Abutment Design & Fabrication 4. Implant Impression 5. Implant Provisional Restoration	1	Restorative
6. Implant Exposure 7. Soft Tissue Development 8. Implant Placement 9. Bone (& Soft Tissue) Development	2	Surgery
10. Implant and Site Planning 11. Treatment Plan 12. Implant Diagnostics	3	Planning
13. Patient Case Presentation / Treatment Acceptance 14. Treatment Plan Proposal 15. Patient Consultation 16. Implant Marketing	4	Patient Engagement
17. Team Training 18. Surgical Set-up / Implant Kit Purchase 19. Office Set-up 20. Knowledge Base and Skills	5	knowledge & People

TABLE 2. Dental Implant Best Practices Checklist[34]

TREATMENT PLANNING

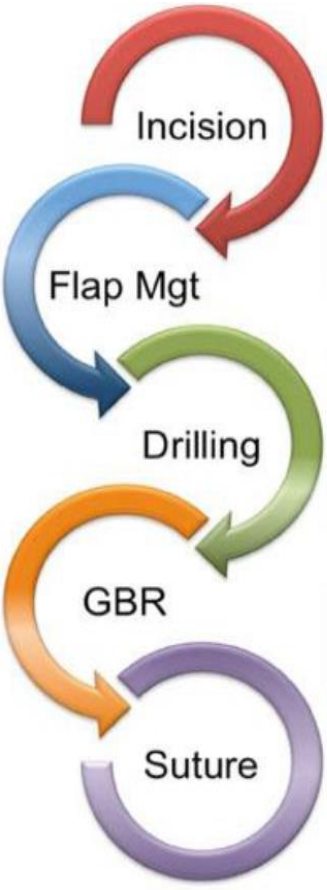
- ☐ Review medical and dental history
- Verify periodontal stability
  - ☐ Bleeding on probing
  - ☐ Probing depths/ attachment levels
  - ☐ Radiographic assessment
  - ☐ Mobility
  - ☐ Suppuration
- Review diagnostic aids
  - ☐ Radiographs
  - ☐ Cone beam computed tomography scans
  - ☐ Models
- ☐ Identify anatomic structures
  If other, please explain:
- ☐ Verify signed patient consent
- ☐ Verify patient has copy of treatment plan
- ☐ Review treatment plan with restorative dentist

INTRAOPERATIVE

- ☐ Review medical and dental history
- ☐ Sedation
- ☐ Protect airway
- ☐ Monitor vitals
- ☐ Surgical guides
- ☐ Check drill speed
- ☐ Intraoperative radiographs
- ☐ Verify angulation/location
- Final torque value: ☐

POSTOPERATIVE

- ☐ Verify angulation clinically
- ☐ Radiograph angulation and seating of abutment/cover screw
- ☐ Prescribe chlorhexidine mouthrinse
- ☐ Bone graft?
- ☐ Prescribe antibiotics
- ☐ Schedule follow-up appointment(s) with patient
- ☐ Provide written postoperative instructions
- ☐ Call patient postoperatively to evaluate recovery from procedure
- ☐ Take radiograph to confirm integration prior to restoration
- ☐ Provide postoperative notes to restorative partner after integration



Score: 5 ---------- 0

1. Proper incision design using standard protocol
2. Fluent placement of incision without hesitation
3. Preservation of the keratinized mucosa

1. No tearing of the flap during the reflection
2. Minimal damage to the soft tissue
3. Enough extension for the visual access

1. Proper distance from neighboring implant and teeth
2. Parallel path with the neighboring teeth
3. Stable hand rest during the drilling
4. Fluent change and proper selection of drills
5. Adaptive drilling based on the bone quality
6. Acquisition of primary stability greater than 10 N/cm^2
7. Installation of fixture within the bony housing

1. Bone graft material placement
2. Placement and fixation of membrane
3. Proper application of releasing incisions
4. Proper use of mattress suture for primary closure

1. Surgeon's square knot
2. Suture spacing 3-5 mm
3. Minimal tension applied

*Correctly performed: 5 / Incorrectly performed: 0 **Total score**: _____

When to Perform Dental Implant Treatment: Training and Supervision

1. Attending Lecture and Hands-On Course

- **Purpose**: Gain foundational knowledge and practical skills.
- **Components**:
    - **Didactic Sessions**: Understanding implant biology, anatomy, surgical techniques, and prosthetics.
    - **Simulation Training**: Practicing on models or simulators to develop technical proficiency.

2. Doing Under Supervision

- **Initial Clinical Experience**:
    - **Mentorship**: Performing procedures under the guidance of experienced implantologists.
    - **Case Selection**: Starting with straightforward cases to build confidence and competence.
- **Progressive Responsibility**:
    - **Complex Cases**: Gradually handling more complex implant cases as skills improve.
    - **Continuous Feedback**: Receiving ongoing feedback and assessment to refine techniques.

Pathway to Independent Practice

1. **Basic Training**:
    - Complete comprehensive courses that include both theoretical and practical components.
2. **Supervised Practice**:
    - Gain hands-on experience under the supervision of qualified mentors.
    - Address various clinical scenarios and complications.
3. **Certification and Continuing Education**:
    - Obtain necessary certifications.
    - Engage in continuing education to stay updated with the latest advancements and techniques in implant dentistry.

သွားမြစ်တုထည့်တာ ခက်လားဆိုရင် မခက်ပါဘူး။ ဒါပေမယ့် စနစ်တကျ သင်ယူမထားရင် ပထမဆုံး ပြုလုပ်တဲ့ ကုသမှုတွေမှာ အလွဲလွဲအချော်ချော်ဖြစ်တာ၊ စိတ်ဖိစီးမှုဖြစ်တာ၊ လိုအပ်ချက်တွေ ရှိနေသေးတာ စသဖြင့် ကြုံရနိုင်ပါတယ်။ စကတည်းက မိမိကို သေသေချာချာ စနစ်တကျ သင်ပေးနိုင်တဲ့ ဆရာသာ ရှိခဲ့ရင် ပထမဦးဆုံး လူနာကို ကုသရတဲ့အချိန်မှာတောင် စိတ်ဖိစီးမှု အနည်းဆုံးနဲ့ အမှားအယွင်းမရှိ ကုသနိုင်မှာ ဖြစ်ပါတယ်။

ဒီနေ့ခေတ်မှာ နည်းပညာတွေ၊ ကုသမှုနည်းလမ်းတွေ၊ စက်ပစ္စည်းကိရိယာတွေ၊ ဆေးပစ္စည်းအသစ်အဆန်းတွေ စဉ်ဆက်မပြတ် ပေါ်ထွက်နေပြီး မိမိဆေးခန်း၊ဆေးရုံမှာ အသုံးချနိုင်ခဲ့ရင် အရင်က ခက်ခက်ခဲခဲ လုပ်ခဲ့ရတာတွေကို လွယ်လွယ်ကူကူနဲ့ ကုသမှုပေးနိုင်မှာ ဖြစ်ပါတယ်။ ဒါ့ကြောင့် မိမိရဲ့ ဆေးပညာအသိကို ခေတ်နဲ့အမီ ဖြစ်နေအောင် လေ့လာခြင်းက မိမိအတွက်ရော၊ လူနာတွေအတွက်ပါ အကျိုးများစေနိုင်ပါတယ်။

3. Dental Implant Imaging Modalities

သွားမြစ်တုကုသမှုပြုလုပ်ဖို့အတွက် လူနာကို CBCT ရိုက်ခိုင်းရပါမယ်။ CBCT ရိုက်ဖို့ မဖြစ်နိုင်တဲ့ နေရာမှာ ဆိုရင် OPG and/or Periapical ဓါတ်မှန် ရိုက်ခိုင်းပါ။

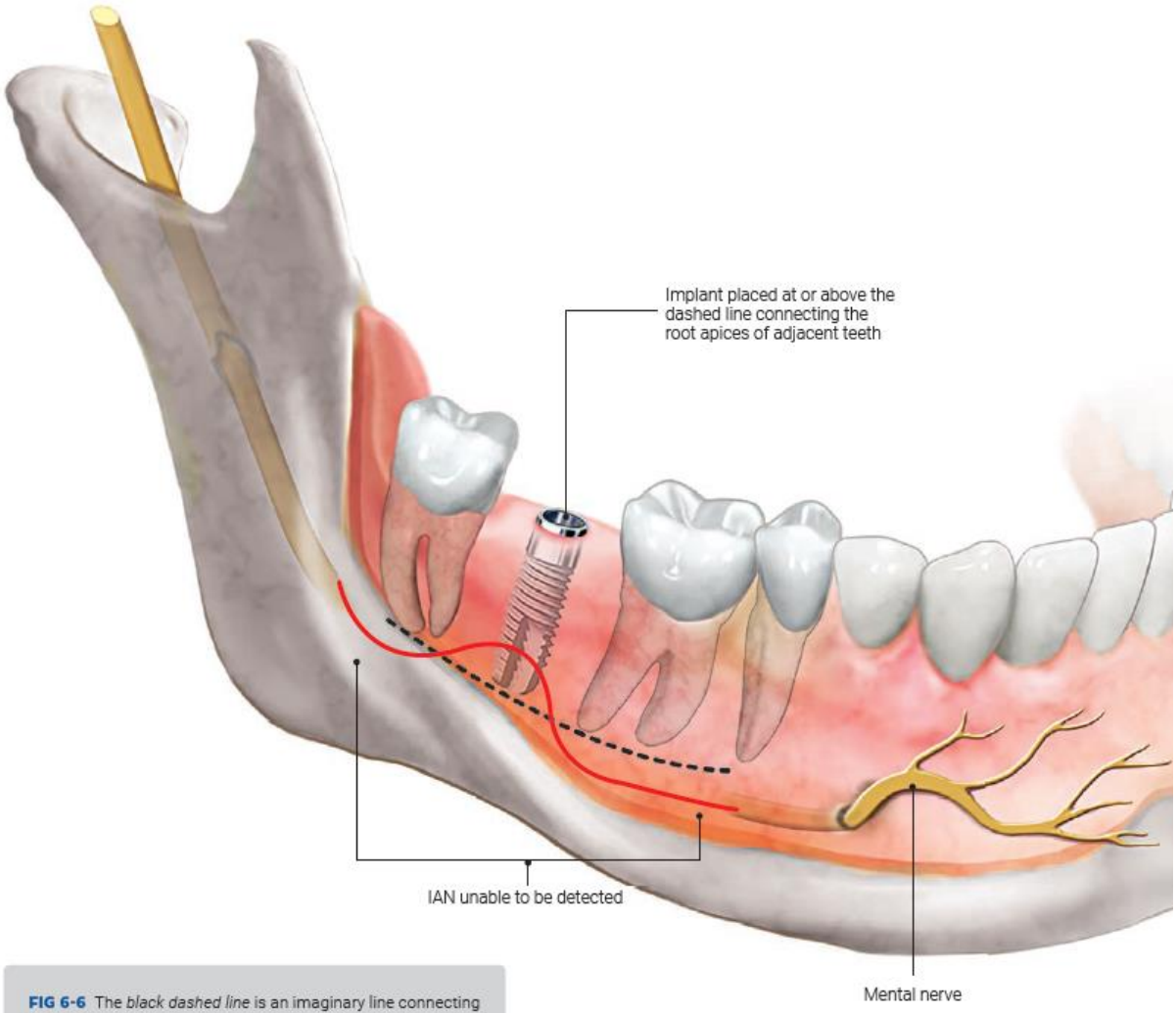


FIG 6-6 The *black dashed line* is an imaginary line connecting the 2 apices of the teeth on each side of the edentulous area that will receive an implant. Placing an implant here is safe as long as it will not go deeper than the *black line*. The *red line* demonstrating an imaginary IAN track that would be interrupted by the implant is impossible.

အထက်မှာ ပြထားတဲ့ပုံအရဆိုရင် CBCT မရိုက်ဘဲ OPG မှာ implant fixture length ကို ခန့်မှန်းမယ်ဆိုရင် ဘေးသွားတွေရဲ့အမြစ်ထိပ်တွေအရ ခန့်မှန်းကြည့်နိုင်ပါတယ်။ Bone mapping techniques တွေကို သုံးပါ။

Key Points for Implant Placement Without CBCT

Thorough Clinical Examination:

Perform a detailed intraoral and extraoral examination.

Assess soft tissues, bone quality, and quantity through palpation and visual inspection.

Medical and Dental History:

Review patient's medical history, including systemic conditions that may affect healing.

Evaluate previous dental treatments and current oral health status.

Radiographic Assessment:

Utilize panoramic and periapical radiographs to evaluate bone height and anatomy.

Interpret radiographs carefully to identify anatomical landmarks and potential complications.

Study Models and Diagnostic Wax-Up:

Create and analyze study models to understand occlusal relationships and spacing.

Use diagnostic wax-up to plan the prosthetic outcome and guide surgical procedures.

Bone Mapping Techniques:

Use bone mapping to assess bone dimensions at the implant site.

Perform bone sounding under local anesthesia to determine bone thickness.

Surgical Guides:

Consider using a surgical guide for precise implant placement.

Fabricate guides based on clinical examination, radiographs, and study models.

Implant Site Preparation:

Ensure adequate irrigation during drilling to prevent bone overheating.

Use sequential drilling to prepare the osteotomy site gradually.

Anatomical Considerations:

Be aware of critical structures such as the inferior alveolar nerve, maxillary sinus, and nasal cavity.

Avoid implant placement near these structures to prevent complications.

Communication with Patients:

Discuss the limitations and potential risks of not using CBCT with patients.

Obtain informed consent, emphasizing the importance of alternative imaging if necessary.

Postoperative Care and Follow-Up:

Provide detailed postoperative instructions to ensure proper healing.

Schedule regular follow-ups to monitor implant integration and address any issues promptly.

These key points aim to ensure safe and effective implant placement even without the use of CBCT. ***However, where possible, CBCT is recommended for its detailed and accurate assessment capabilities***.

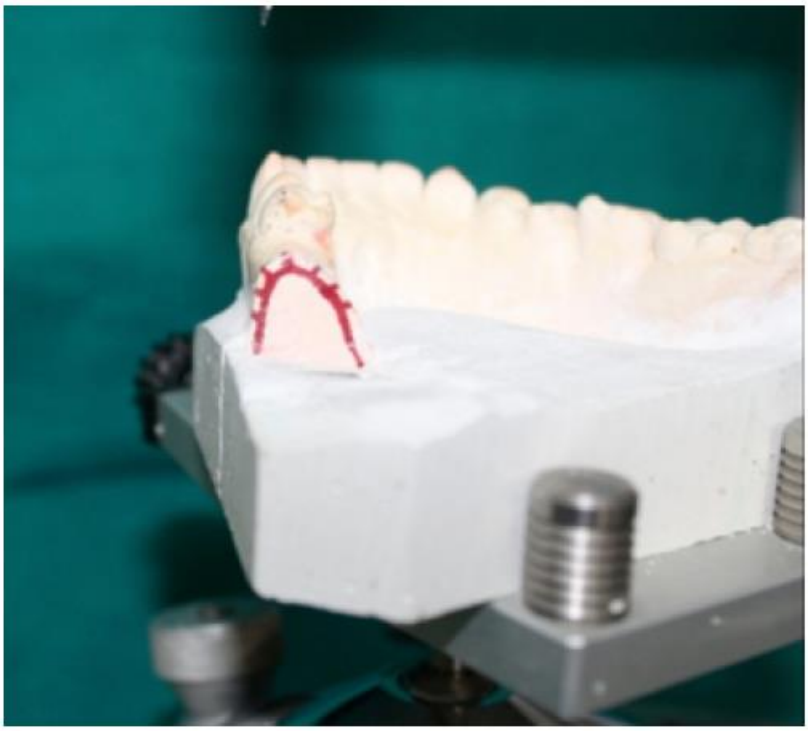


Fig. 3: Measurements performed at all the marked points and the transferred to the cast for measuring (buccal-lingual) ridge width.

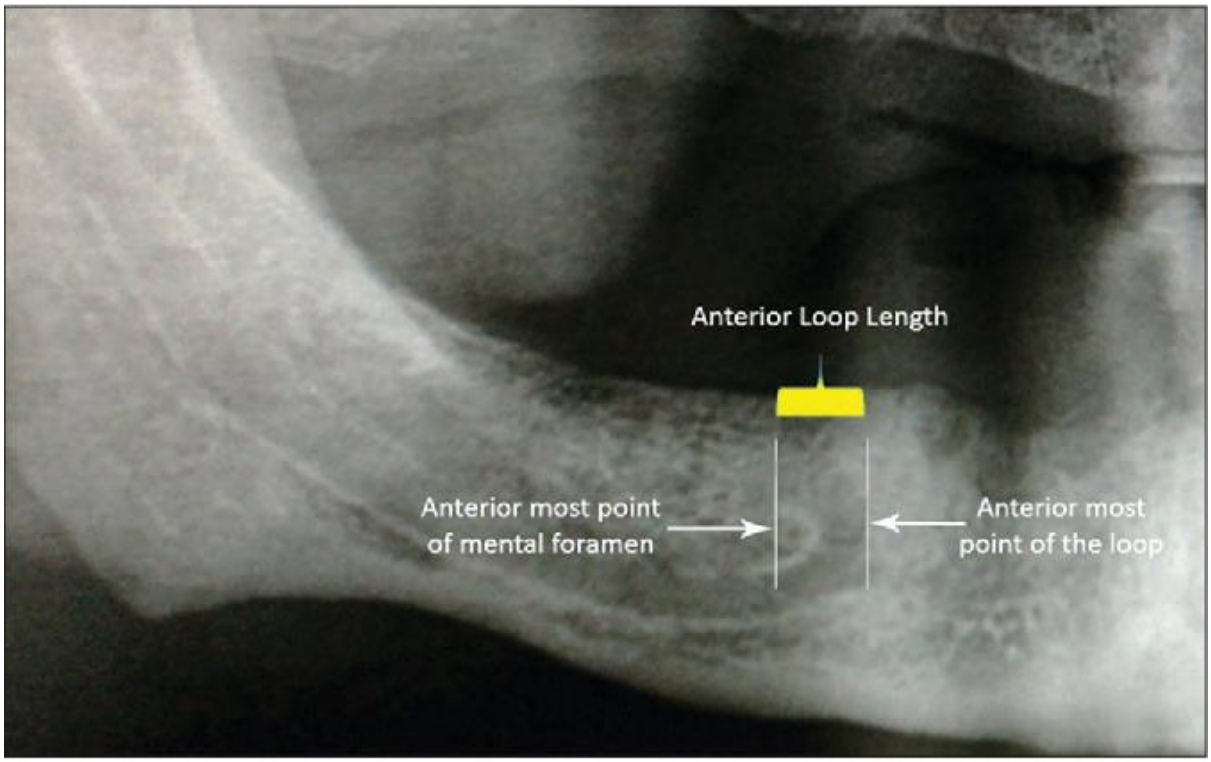


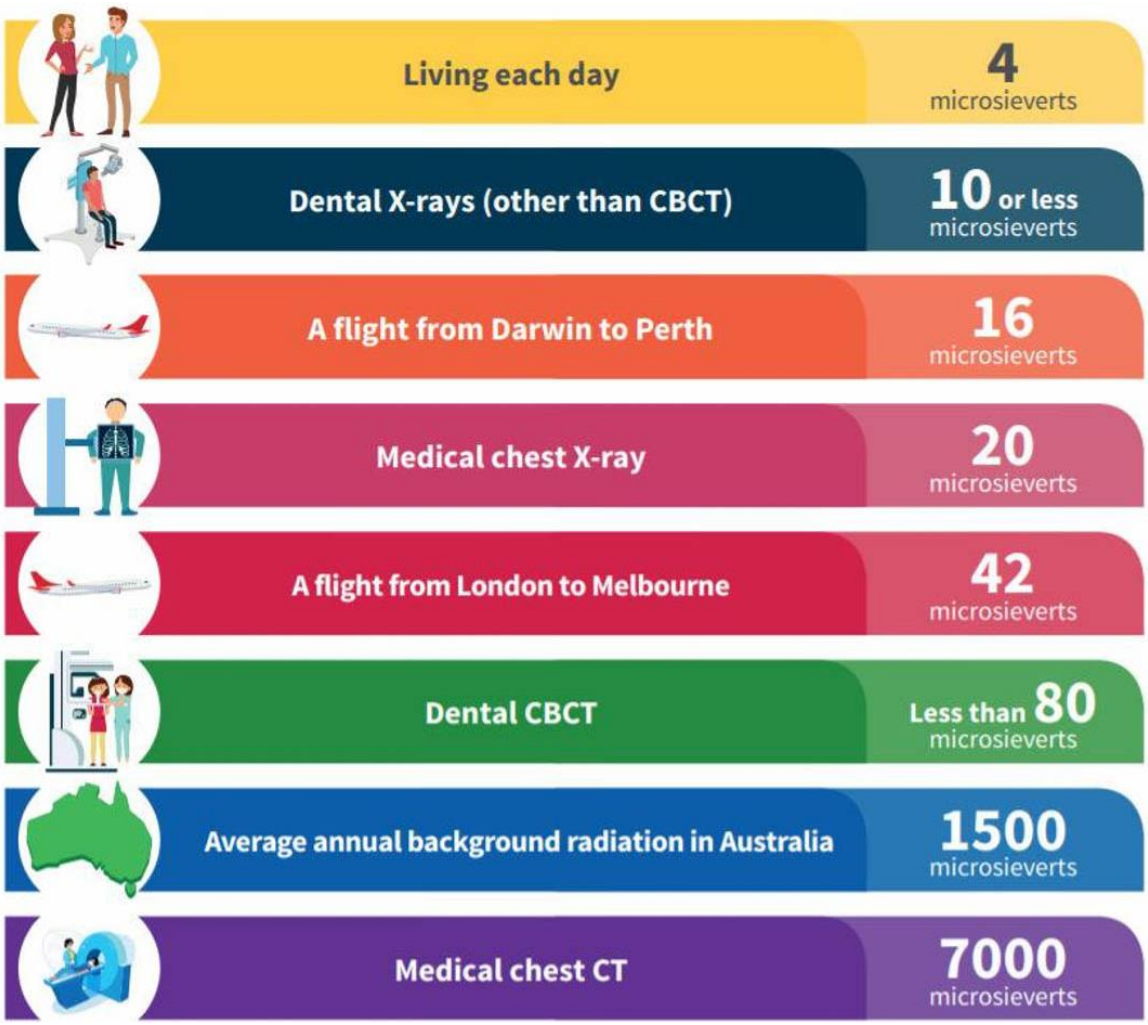
Figure 1: Reference points for measuring inferior alveolar nerve

Banana Equivalent Dose

Bananas are a natural source of radioactive isotopes.

Eating one banana = 1 BED = 0.1 μSv = 0.01 mrem

Number of bananas	Equivalent exposure
100,000,000	Fatal dose (death within 2 weeks)
20,000,000	Typical targeted dose used in radiotherapy (one session)
70,000	Chest CT scan
20,000	Mammogram (single exposure)
200 - 1000	Chest X-ray
700	Living in a stone, brick or concrete building for one year
400	Flight from London to New York
100	Average daily background dose
50	Dental X-ray
1 - 100	Yearly dose from living near a nuclear power station



Key Points Obtained from CBCT for Dental Implant Placement

Detailed Bone Assessment:

Evaluate bone volume, density, and quality in three dimensions.

Identify the precise location and thickness of cortical and cancellous bone.

Anatomical Accuracy:

Accurately locate critical anatomical structures such as the inferior alveolar nerve, maxillary sinus, nasal cavity, and mental foramen.

Measure distances to these structures to avoid complications.

Pathology Detection: Identify and assess any pathology such as cysts, tumors, or infections that might affect implant placement.

Assessment of Ridge Topography:

Analyze the contour and shape of the alveolar ridge to plan for optimal implant positioning.

Sinus Evaluation:

Examine the maxillary sinuses for sinus membrane health and thickness.

Assess the need for sinus lift procedures.

Cross-Sectional Views:

Obtain cross-sectional images to visualize the buccolingual width of the bone.

Determine the angulation and alignment of the implant relative to the occlusal plane.

Proximity to Adjacent Teeth:

Evaluate the spatial relationship between the implant site and adjacent teeth.

Ensure sufficient space is maintained to avoid damaging neighboring roots.

Surgical Guide Fabrication:

Use CBCT data to design and fabricate precise surgical guides.

Enhance the accuracy of implant placement and minimize deviations.

Treatment Planning: Facilitate comprehensive treatment planning by integrating CBCT data with digital impressions and prosthetic designs.

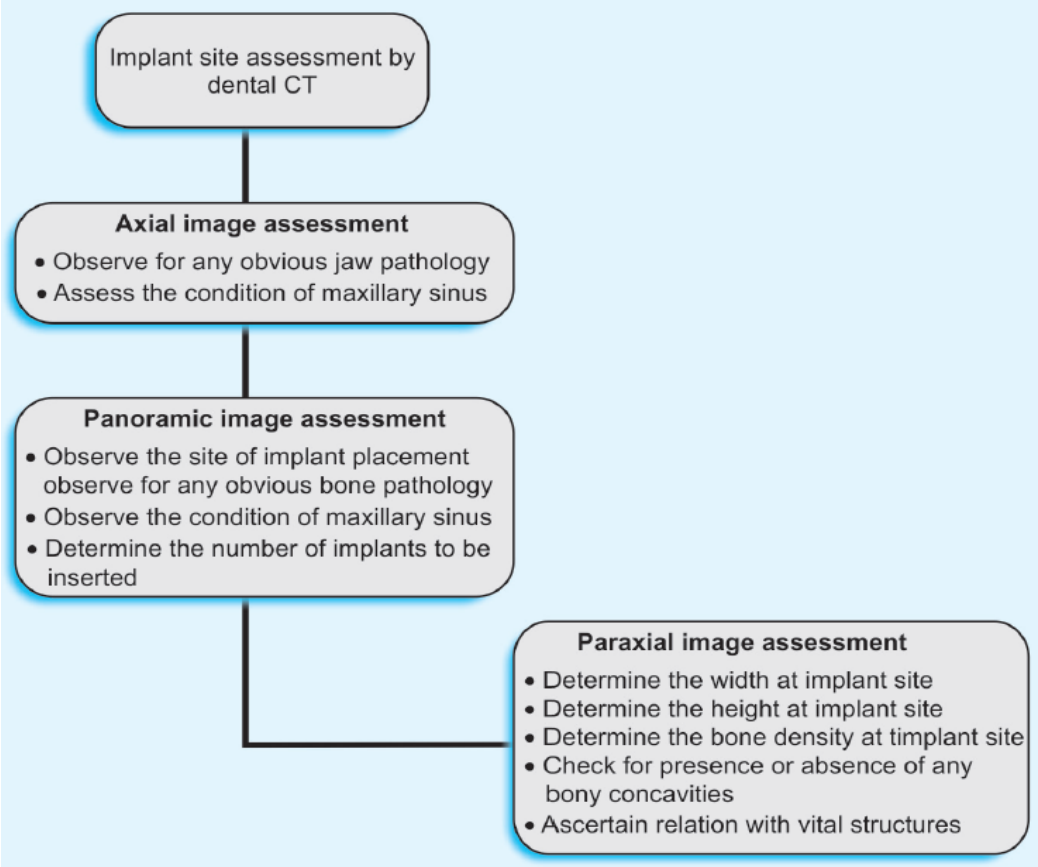
Improve communication with patients by visually explaining the planned procedure.

Postoperative Evaluation:

Monitor the integration and stability of the implant post-surgery.

Detect any early signs of complications or failures.

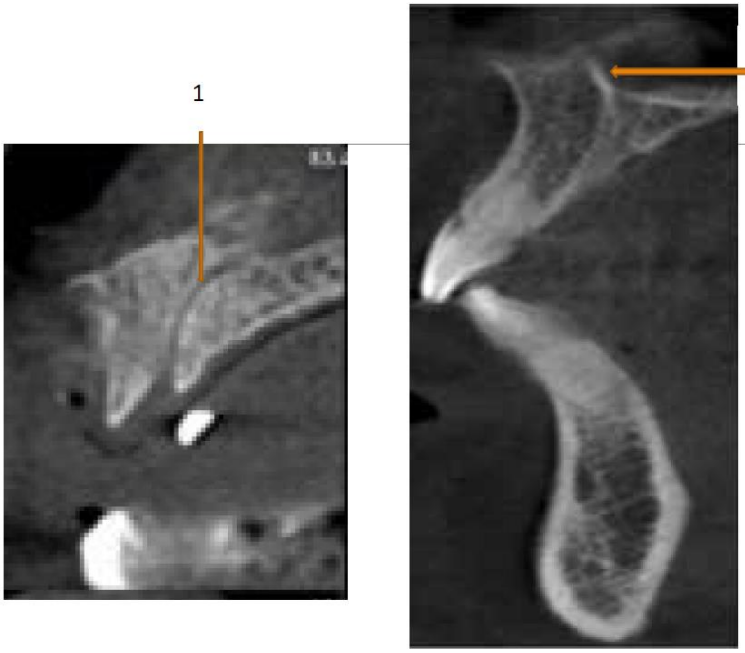
These points highlight the significant advantages of using CBCT in dental implantology, providing comprehensive and precise information for optimal treatment outcomes.



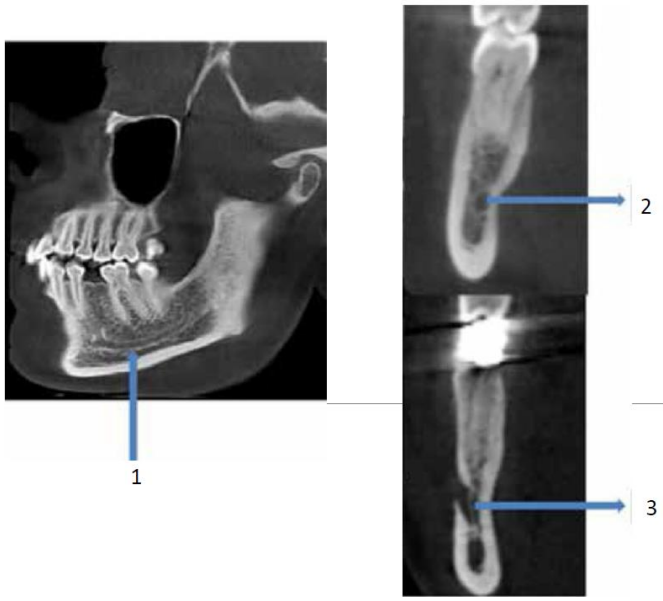
1. The location of important structures
   A. Mandibular canal
   B. Anterior loop and extension of the mandibular canal
   C. Mental foramen
   D. Maxillary sinus (floor, septums, walls, pathologic features)
   E. Nasal cavity
   F. Incisive foramen
2. Bone height
3. Root proximity and angulation of existing teeth
4. Evaluation of cortical bone
5. Bone density and trabeculation
6. Pathologic features (eg, abscess, cyst, tumor)
7. Existence of anatomic variants (eg, incomplete healing of extraction site, impacted teeth)
8. Cross-sectional topography and angulation (best determined using CT and CBCT)
9. Sinus health (best evaluated using CT and CBCT)
10. Skeletal occlusal classification (best evaluated using lateral cephalometric images)

The critical measurements specific to implant placement include the following:

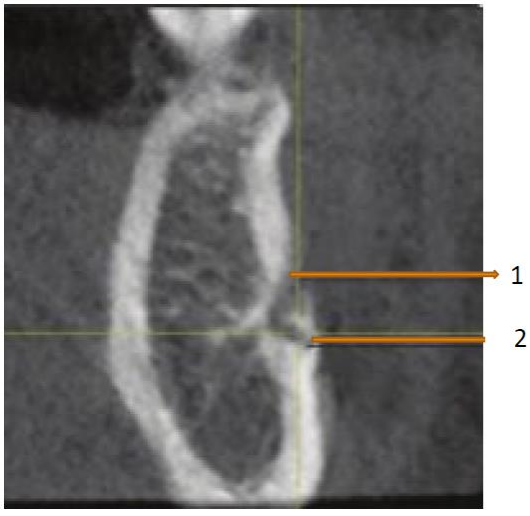
1. At least 1 mm inferior to the floor of the maxillary and nasal sinuses
2. Incisive canal (maxillary midline implant placement) to be avoided
3. Five millimeters anterior to the mental foramen
4. Two millimeters superior to the mandibular canal
5. Three millimeters from adjacent implants
6. One and one half millimeters from the roots of the adjacent teeth



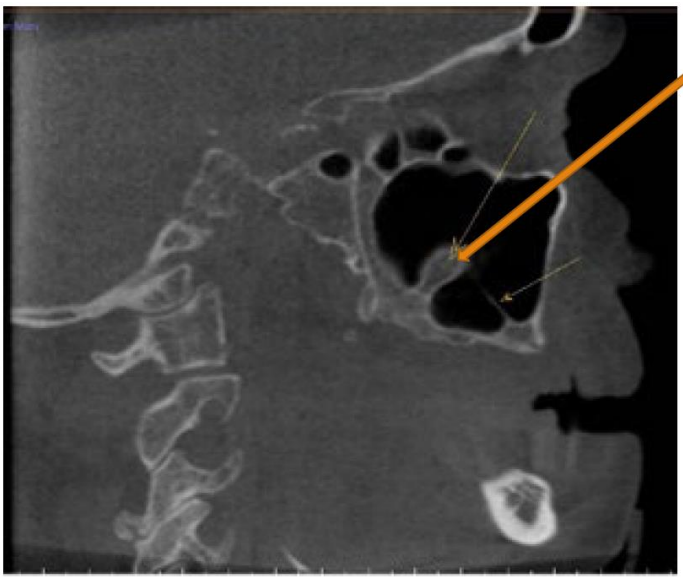
Sl.No	Section	Landmark
1.	Sagittal	Incisive canal
2.	Sagittal	Floor of nasal fossa



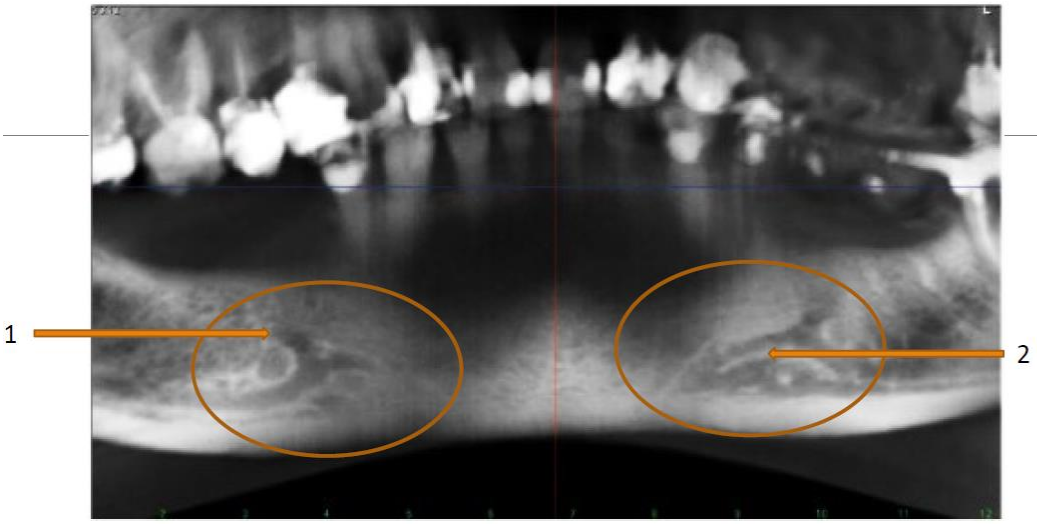
Sl.No	Section	Landmark
1	Sagittal	Mandibular canal
2	Cross sectional	Mandibular canal
3	Cross sectional	Mental foramen



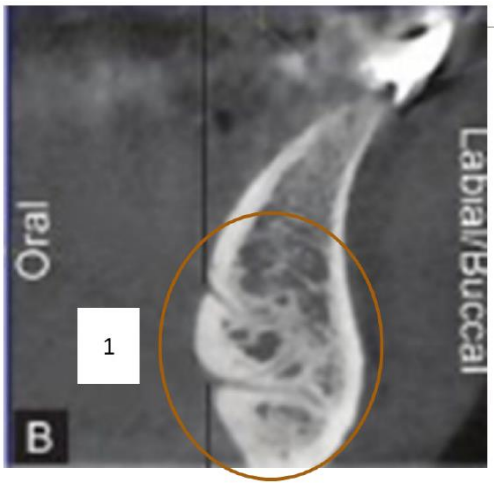
Sl.No	Section	Landmark
1.	Cross sectional	Mental foramen
2.	Cross sectional	Inferior alveloar canal



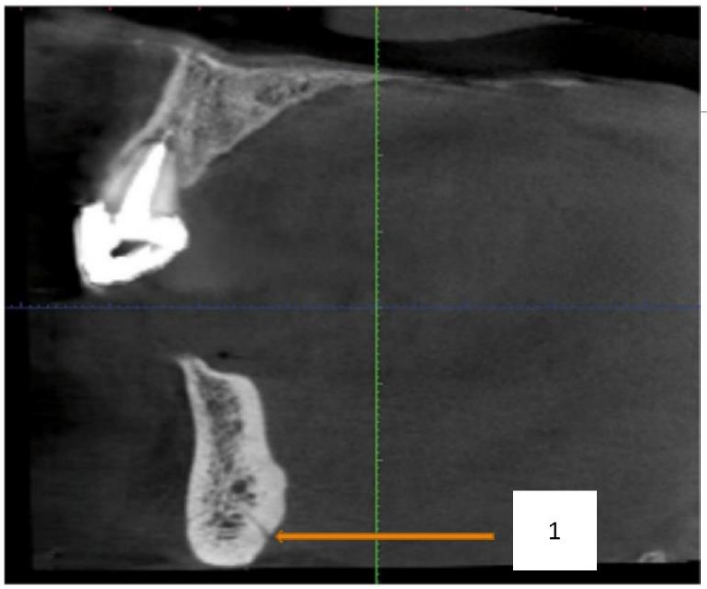
Sl.No	Section	Landmark
1.	sagittal	Septa in maxillary sinus



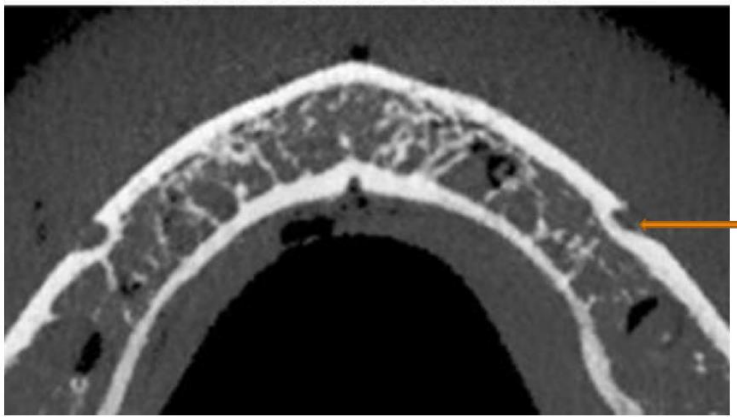
Sl.No	Section	Landmark
1.	Panaromic	Anterior loop
2.	Panaromic	Incisive canal



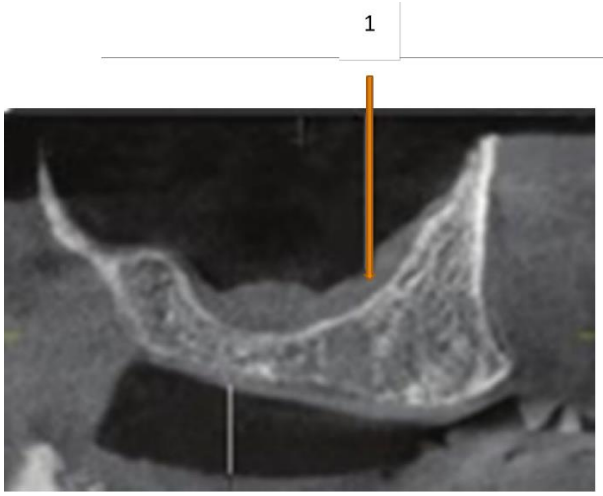
Sl.No	Section	Landmark
1.	Sagittal	Lingual vascular canal



Sl.No	Section	Landmark
1.	Sagittal	Lingual foramen

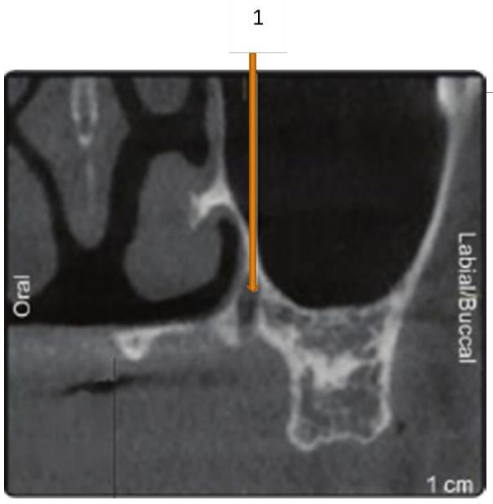


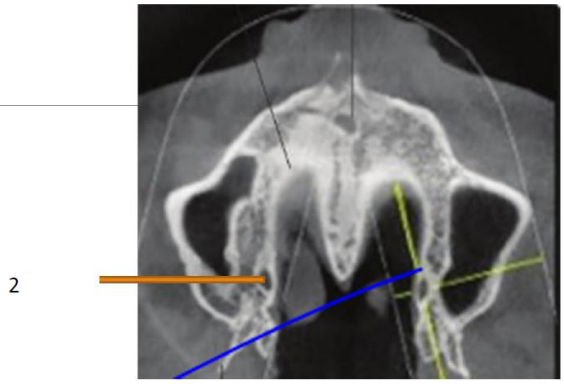
Sl.No	Section	Landmark
1.	axial	Mental foramen



Sl.No	Section	Landmark
1.	coronal	Mucosal thickening in maxillary sinus

Sl.No	Section	Landmark
1.	Coronal	Benign mucosal cyst





Sl.No	Section	Landmark
1.	Coronal	Greater palatine canal
2.	Axial	Greater palatine foramina

BONE		DENSITY
D1	>1250 HU	Dense cortical bone
D2	850-1250 HU	Thick dense to porous cortical bone on crest and coarse trabecular bone within
D3	350-850 HU	Thin porous cortical bone on crest and fine trabecular bone within
D4	150-350 HU	Fine trabecular bone
D5	<150 HU	Immature, non-mineralized bone

Figure 3: Bone density classification by Misch[16]

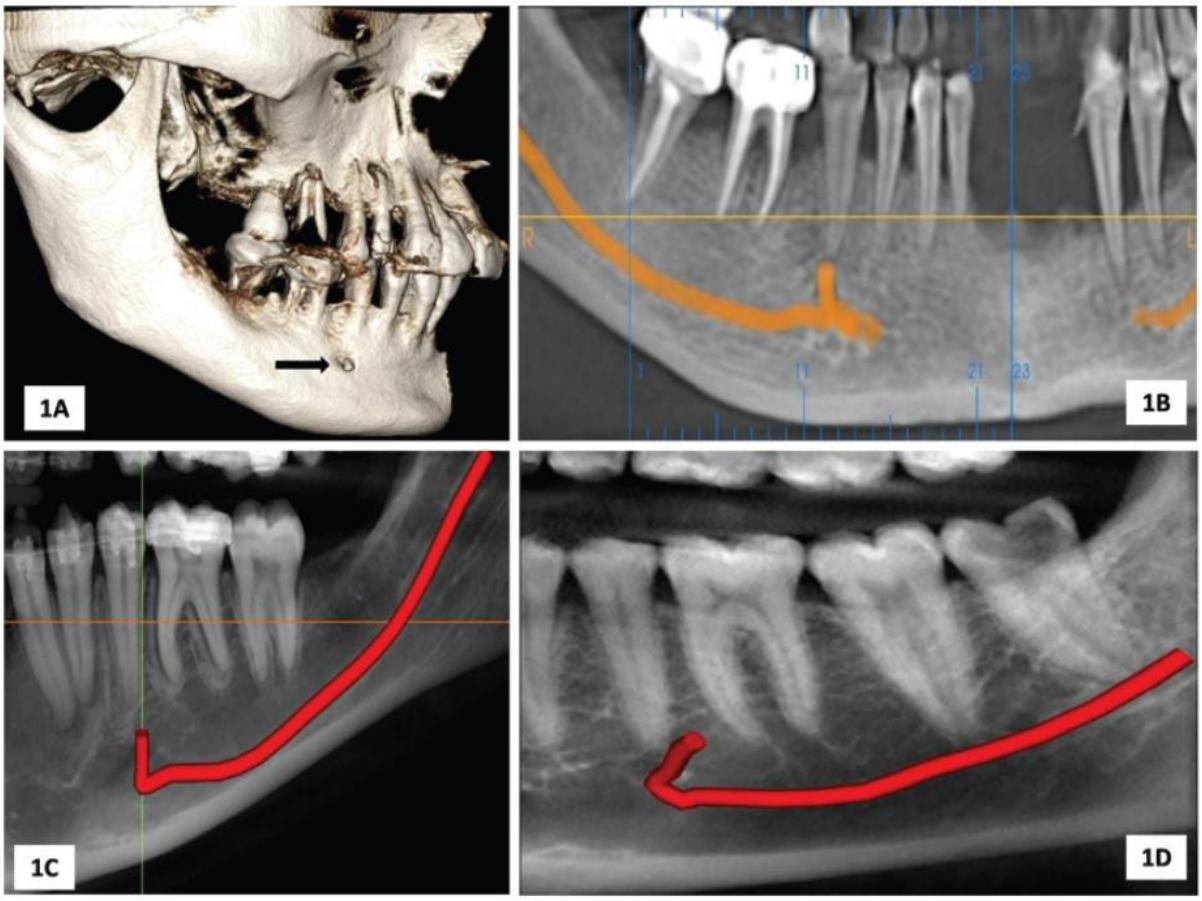


Figure 1 - This is a figure depicting the CBCT scan images showing the various aspects of mental nerve (MN) and its related anatomical structures investigated in the study: (A) Volume rendering image of CBCT is shown with a arrow (black) pointing towards the most common location of the mental foramen (MF) – apex of the 2nd premolar; (B) panoramic reformatted image of CBCT showing the emergence pattern of MN while taking exit from MF – Type I (C) Type II (D) the most common pattern seen in the study – Type III (anterior loop).

Figure 1. Posterior superior alveolar artery shown in CBCT.

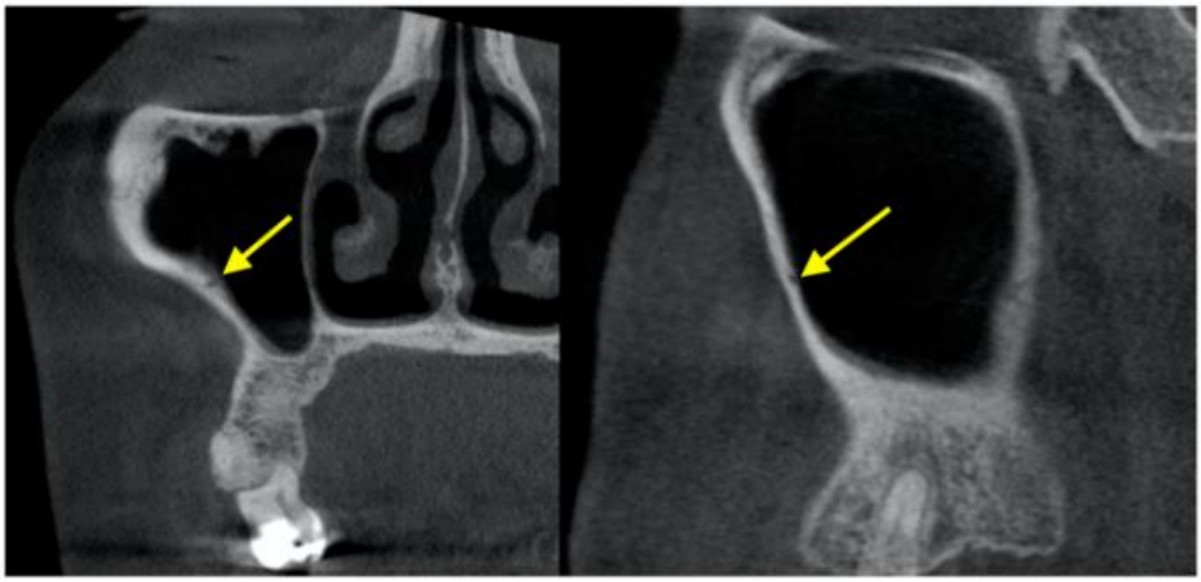


Figure 2. Nasal septum on the sinus floor.

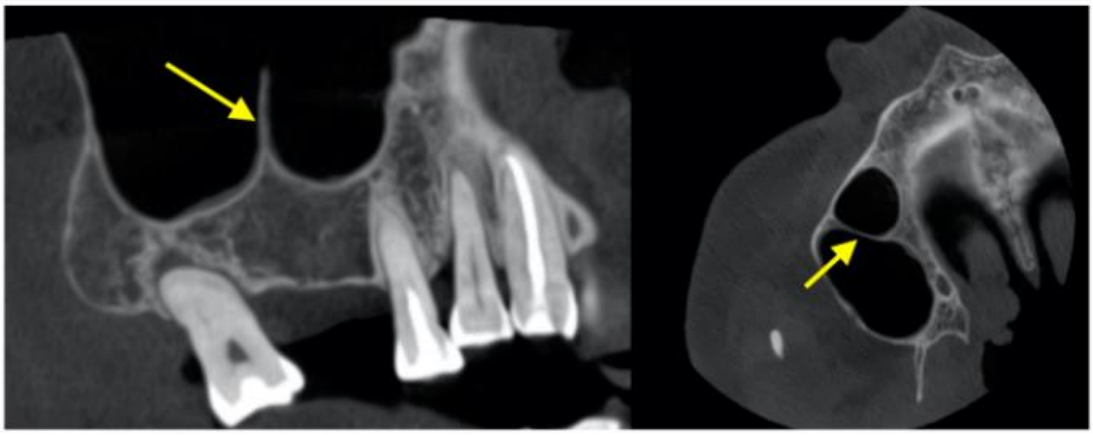


Figure 3. Primary ostium (asterisk) in both maxillary sinuses and accessory ostium (arrow) in the left maxillary sinus.

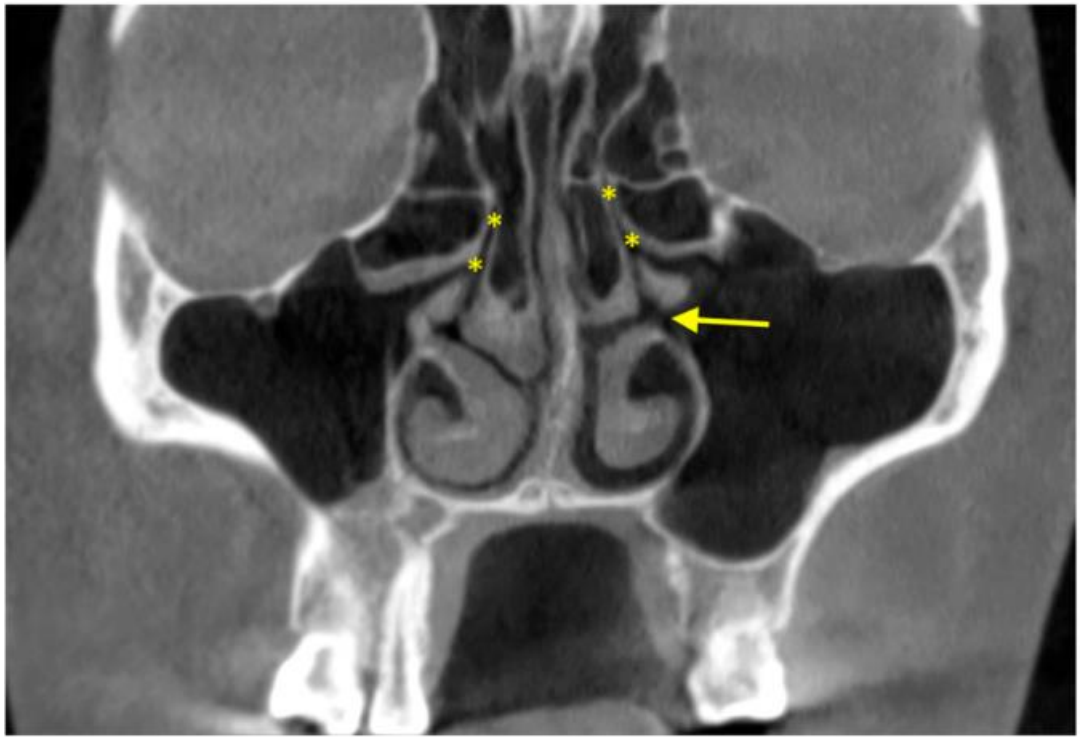


Figure 4. Sinus membrane thickening (solid arrow) in the left maxillary sinus associated with a periapical lesion (dotted arrow).

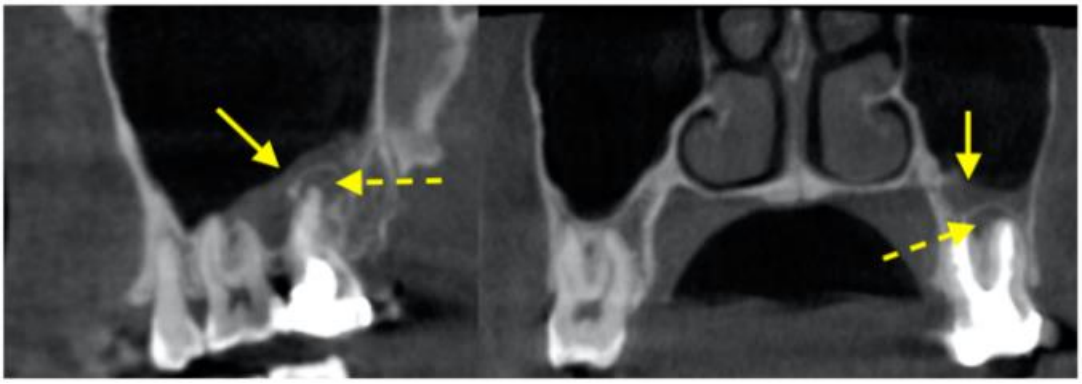


Figure 5. Mucous retention cyst in the left maxillary sinus.

Figure 6. Antrolith found on the sinus floor of the right maxillary sinus.

Age greater than 35 and male sex are associated with higher frequency of maxillary sinus septa

Cross-sectional study of maxillary sinus septa at a Saudi dental school

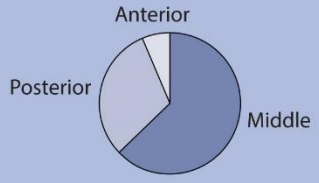
Cone beam computed tomography scans of 1010 maxillary sinuses from 505 patients

Septa were present in 232 (46%) patients, 370 (37%) sinuses

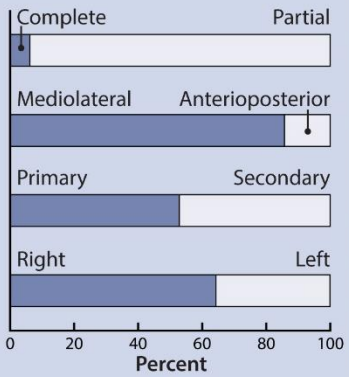
58.5% of men, 34% of women

≥ 60% of people ≥ 35 years of age

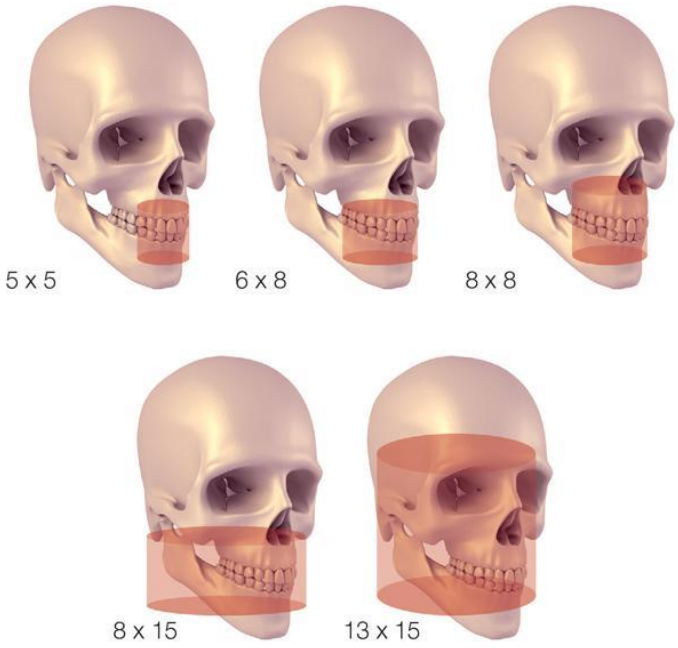
Positions of septa

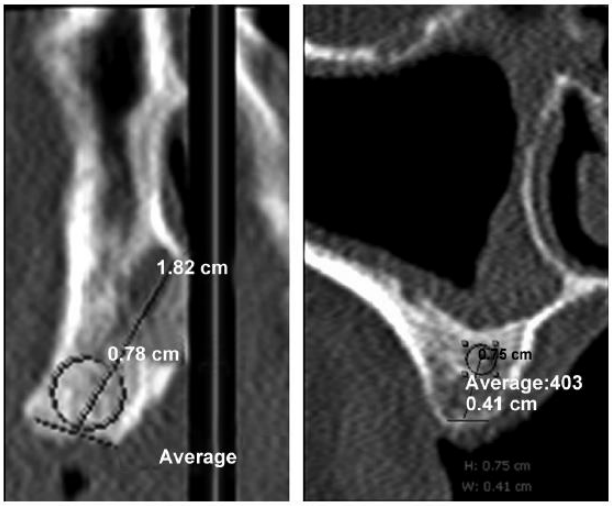


Characteristics of septa



M. S. Al-Zahrani, *et al.*, Prevalence and morphological variations of maxillary sinus septa in different age groups: a CBCT analysis. *Ann. Saudi Med.* 2020; 40(3): 200-206 DOI: 10.5144/0256-4947.2020.200.





SA 1 SA3

Fig. 5.5 Radiographic appearance of SA 1 and SA 3 on dental CT

Table 5.2: Height available at implant sites and proposed treatment plan

Groups	*Height available at the implant site (mm)*	*Treatment available*
SA 1	>12 mm	Conventional implant procedure
SA 2	10–12 mm	Sinus lift, division A root form
SA 3	5–10 mm	Lateral wall approach sinus graft and delayed division A root form
SA 4	<5 mm	Lateral wall approach sinus graft and delayed division A root form

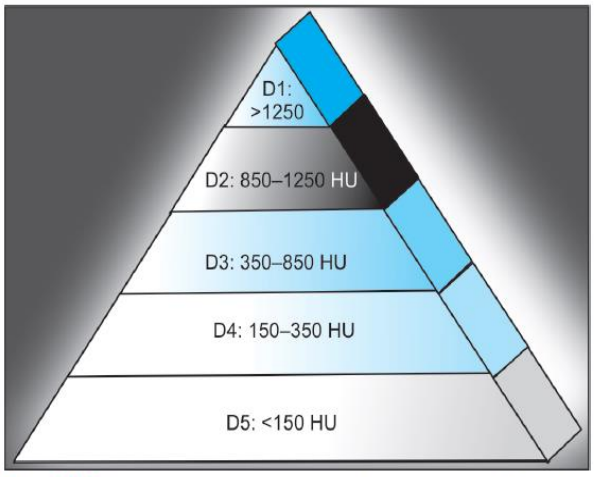


Fig. 6.11 Bone density based on HU values given by Misch D1: > 1250 HU; D2: 850–1250 HU; D3: 350–850 HU; D4: 150–350 HU; D5: <150 HU

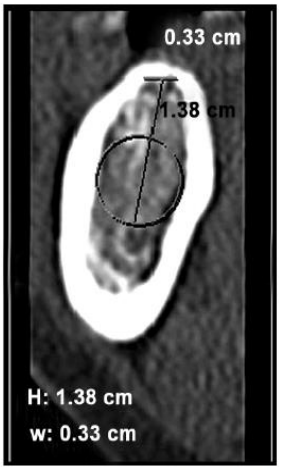


Fig. 6.12 Density measurement on dental CT software at a distance of 7 mm as advised by misch

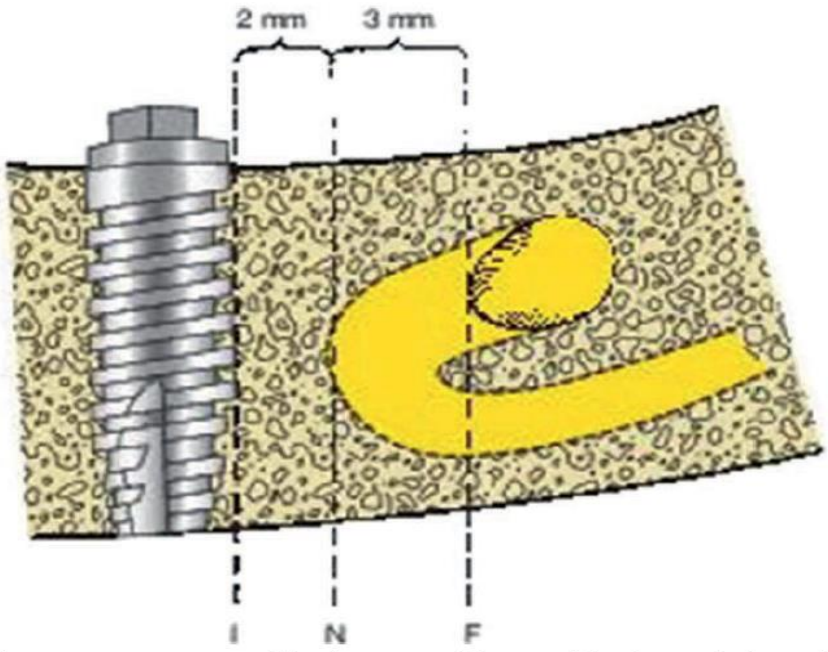


FIGURE V-1. The most-anterior extent of the bony mental foramen (F) is frequently located posterior to the most-anterior extent of the mental nerve before it exits from the bone (N). The most posterior aspect of the implant (I) should be placed a minimum of 2 mm from the nerve. Thus, the implant must be placed 5 mm anterior to the most-anterior aspect of the bony mental foramen. Radiographic images are used to show mental nerve path and foramen.[1]

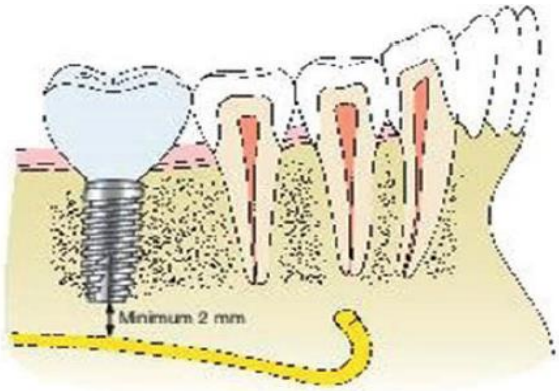


FIGURE V-2. The apical end of posterior mandibular implants should be a minimum of 2 mm from the superior aspect of the inferior alveolar canal.[1]

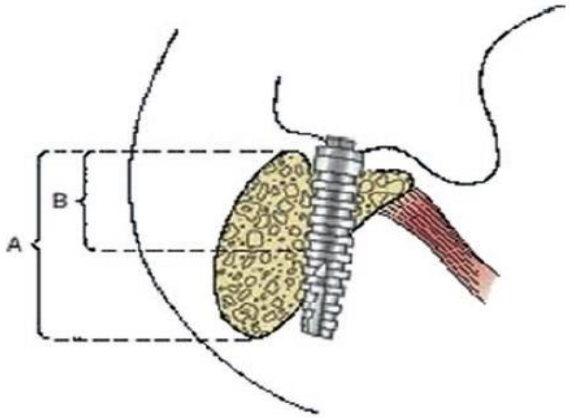


FIGURE V-3. The mylohyoid muscle tends to maintain the bone along its attachment to the mandible. Frequently, a significant narrowing of the mandible (undercut) is found below the mylohyoid ridge. If the implant length, position, and angulation do not compensate for this anatomic feature, the implant will perforate the lingual cortical plate. *A*, Bone height when viewed on a lateral radiograph. *B*, Actual height of available bone in the area desired for implant placement.[1]

4. Assessment of Bone Quantity and Quality

သွားမြစ်တုကို အရိုးထဲမှာ ထည့်စိုက်တာဖြစ်တဲ့အတွက် သွားမြစ်တုထည့်မယ့်လူနာရဲ့အရိုးကို quality and quantity စစ်ဆေးကြည့်ရပါမယ်။ အရိုးကောင်းမွန်နေရင် သွားမြစ်တုရဲ့ primary stability ကောင်းမွန်မှာ ဖြစ်ပါတယ်။ ဒါ့အပြင် အရိုးနည်းနေလို့ bone augmentation လုပ်ရတာမျိုး မရှိတော့ဘဲ အလွယ်တကူ သွားမြစ်တုကို ထည့်လို့ ရစေပါတယ်။ အရိုးကောင်းမကောင်းကို သိဖို့ clinical examination လုပ်ပြီးနောက် CBCT ရိုက်ကြည့်မှသာ သိရမှာ ဖြစ်ပါတယ်။ CBCT ရိုက်ကြည့်ထားပြီး တွက်ချက်ထားပေမယ့် လူနာမှာ သွားမြစ်တုထည့်ဖို့ flap သေချာလှန်ကြည့်လိုက်မှ အရိုးက ထင်သလောက်ရှိမနေတတ်တာမျိုး တွေ့ရလေ့ ရှိပါတယ်။ CBCT မှာ bone density တိုင်းကြည့်တဲ့အခါ bone density များသလို ဖြစ်နေပေမယ့် တကယ်တမ်း အရိုးကို drill နဲ့ ဖောက်ကြည့်လိုက်တဲ့အခါ အရိုးက ပျော့နေတာမျိုးလည်း ကြုံရတတ်ပါတယ်။

Importance of bone density

Primary Stability: Higher bone density (D1, D2) generally offers better initial stability for implants.

Osseointegration: Adequate bone density is critical for successful osseointegration, where the implant fuses with the bone.

Surgical Technique: Bone density influences the choice of drilling protocols, implant type, and potential need for bone augmentation procedures.

Understanding bone density is essential for predicting the success of dental implants and planning appropriate treatment strategies.

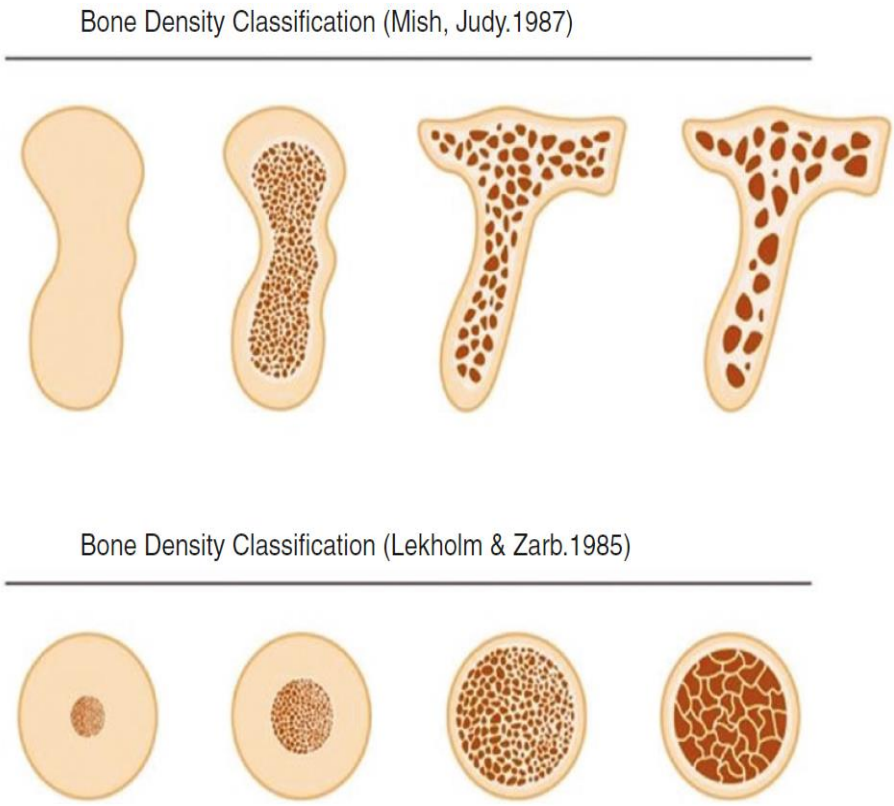


Fig. 5.1 Bone quantity classification

Bone density is crucial in implant dentistry as it influences the stability and success of dental implants. It is typically classified into four types, often referred to as the Lekholm and Zarb classification:

D1 (Type 1):

Description: Dense cortical bone.

Location: Often found in the anterior mandible.

Characteristics: Very hard and dense, less vascular.

Implant Consideration: Excellent primary stability but requires careful preparation to avoid overheating the bone during drilling.

D2 (Type 2):

Description: Thick cortical bone surrounding a core of dense trabecular bone.

Location: Typically found in the anterior maxilla and posterior mandible.

Characteristics: Good primary stability and vascularity.

Implant Consideration: Ideal for implant placement, balancing density and vascularity.

D3 (Type 3):

Description: Thin cortical bone with dense trabecular bone.

Location: Common in the posterior maxilla and anterior mandible.

Characteristics: Less dense than D2, moderate vascularity.

Implant Consideration: Requires careful surgical technique to ensure stability.

D4 (Type 4):

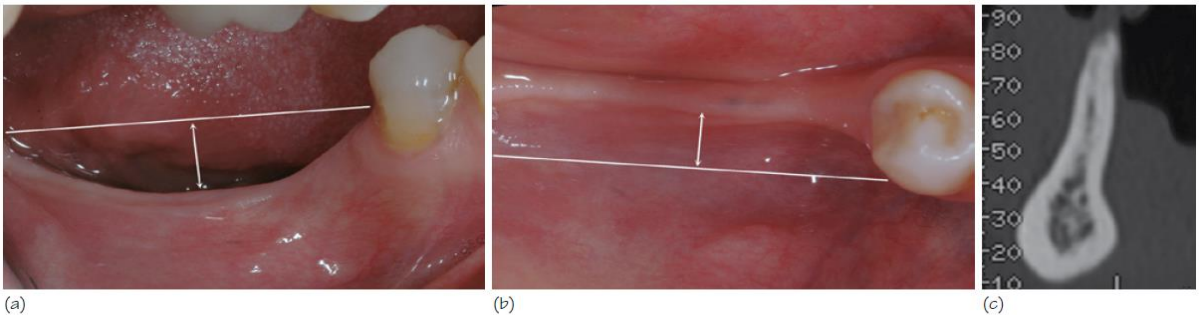
Description: Thin cortical bone with low-density trabecular bone.

Location: Often found in the posterior maxilla.

Characteristics: Least dense, high vascularity.

Implant Consideration: Challenging for implants, may require additional techniques like bone grafting or longer healing times to achieve stability.

Figure 6.3 (a, b) Clinical examination shows a thin edentulous alveolar ridge with horizontal and vertical bone resorption. (c) The clinical conditions are confirmed by tomography



(a) (b) (c)

Table 5.1 Dental radiology classification: Hounsfield units

D1	HU 1250 and above
D2	HU 850
D3	HU 350–850
D4	HU 150–350

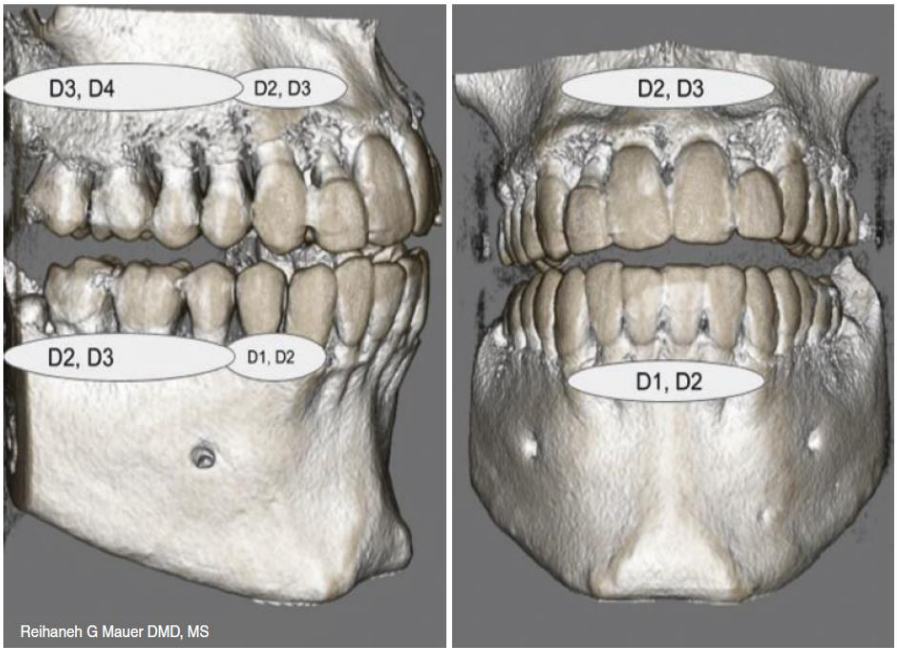


Fig. 7.2 Depicted bone density classification of jaw sites for different bone density types

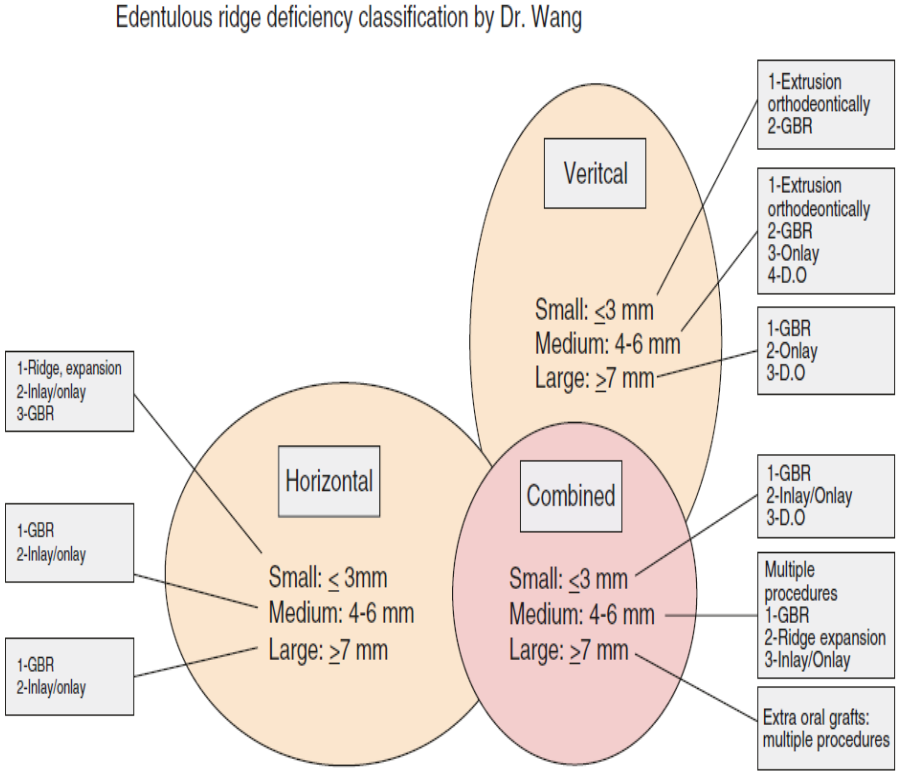


Fig. 7.4 Hom-Lay Wang classification and recommended treatment options [28]. *D.O* distraction osteogenesis, *GBR* guided bone regeneration

5. Case Selection for Implant Treatment

သွားမြစ်တုစိုက်ဖို့အတွက် case selection လုပ်ခြင်းဟာ အရေးကြီးပါတယ်။ အထူးသဖြင့် သွားမြစ်တုကို စတင်အသုံးပြုတဲ့ beginner တွေအတွက် ပိုအရေးကြီးပါတယ်။ Case selection သေချာမလုပ်ဘဲ လာပြတဲ့ လူနာကို သွားမြစ်တုစိုက်ချင်လွန်းလို့ စိုက်ပေးလိုက်တဲ့အခါ မျှော်လင့်မထားတဲ့ နောက်ဆက်တွဲပြဿနာတွေ ကြုံရတတ်ပါတယ်။ အထူးသဖြင့် absolute contraindications အခြေအနေမှာ ရှိနေတဲ့ လူနာတွေကို သွားမြစ်တု စိုက်မပေးသင့်ပါဘူး။ မဖြစ်မနေ စိုက်ပေးရမယ်ဆိုရင် ဖြစ်လာနိုင်တဲ့အခြေအနေအားလုံးကို လူနာကို ရှင်းပြထားပြီး consent ယူထားသင့်ပါတယ်။

Absolute Contraindications

Uncontrolled Diabetes Mellitus: Poor glycemic control can impair healing and increase the risk of infection and implant failure.

Severe Immunocompromised States: Conditions such as advanced HIV/AIDS or patients undergoing immunosuppressive therapy (e.g., organ transplant recipients, certain cancer treatments) increase the risk of infections and poor healing.

Active Cancer: Patients currently undergoing treatment for cancer (chemotherapy or radiation therapy) are at higher risk of complications and implant failure.

Severe Psychiatric Disorders: Conditions that impair the ability to understand and consent to the procedure, or that significantly affect the ability to comply with post-operative care and maintenance.

Substance Abuse: Chronic alcoholism or drug abuse can interfere with post-operative care and healing.

Osteoradionecrosis: Patients with a history of radiation therapy to the jawbone have a significantly increased risk of osteoradionecrosis, which compromises bone healing and implant integration.

Severe Blood Dyscrasias: Conditions like severe anemia, leukopenia, or thrombocytopenia can impair healing and increase the risk of post-surgical bleeding and infection.

Acute or Active Infections: Active oral infections, such as untreated periodontitis or osteomyelitis, need to be resolved before considering implant placement.

Certain Bone Diseases: Conditions like severe osteoporosis or Paget's disease of bone, which significantly impair bone quality and healing capacity.

Uncontrolled Systemic Diseases: Conditions such as severe cardiovascular diseases, severe respiratory diseases, or uncontrolled hypertension that pose a high surgical risk.

Smoking –

- Occurrence and severity of the periodontal disease
- Wound healing
- Increased incidence of peri-implantitis
- Protocol suggested by Bain –
- Patient should cease smoking for a minimum of 1week prior to and atleast 8weeks after implant surgery

Mouth opening

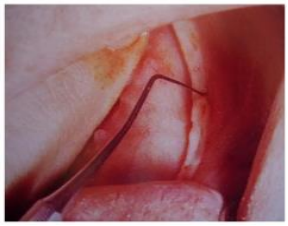
- Periodontal evaluation –
- Pocket depth
- Plaque and gingival index

- Dentition -

- Jaw relation –
- Severe forms of Cl-II and Cl-III require orthodontic treatment and orthognathic surgery

- Occlusion
- Evaluate present occlusion for interference, Occlusal wear, prematurities,associated muscle tenderness and limited range of mandibular movements

- Soft tissue examination
- The soft tissue specially should be examined for
- Unfavorable frenum and muscle attachments
- Presence of any lesions
- Keratinized tissue



- Lip line
- The lip positions are evaluated including resting lip line, maxillary high lip line and mandibular low lip line. The resting lip line is especially noted if maxillary anterior teeth are to be replaced.

- Crown height space
- Measured from the crest of the bone to the plane of occlusion
- Vertical cantilever
- Minimum crown height required for a fixed restoration is 8mm

- Parafunctional habits –
- Have been identified as concerns in implant treatment planning due to the increased pressure on the implants, resulting in possible metal fatigue and fracture
- Bruxism
- Clenching
- Tongue thrusting

Key Components of Medical Evaluation:

Comprehensive Medical History:

Systemic Diseases: Assess for diabetes, cardiovascular disease, osteoporosis, etc.

Past Surgeries: Document previous surgeries, particularly those involving the oral cavity and jaw.

Medications: Record all medications, including over-the-counter drugs and supplements.

Allergies: Identify any known allergies, especially to anesthesia or medications used in dental procedures.

Substance Use: Document smoking, alcohol consumption, and drug use.

Physical Examination:

Oral Examination: Evaluate the condition of the oral cavity, including soft tissues, existing teeth, and bone structure.

Vital Signs: Check blood pressure, heart rate, and other vital signs to ensure overall health stability.

Diagnostic Imaging:

X-rays: Panoramic or periapical X-rays to assess bone quality and quantity.

CT Scans: Provide detailed 3D images of the jawbone structure, aiding in precise implant placement planning.

Laboratory Tests:

Blood Tests: Evaluate blood sugar levels, complete blood count, coagulation profile, and other relevant parameters.

Specific Tests: Additional tests based on the patient's medical history (e.g., thyroid function tests, liver function tests).

Risk Assessment:

Bone Density: Assess bone density to determine the feasibility of implant placement.

Healing Capacity: Evaluate factors that may affect healing, such as immune status and nutritional deficiencies.

Behavioral Assessment: Consider patient compliance with post-operative care and maintenance.

Consultation with Specialists:

Medical Specialists: Collaborate with the patient's healthcare providers (e.g., endocrinologists, cardiologists) for managing underlying medical conditions.

Oral Surgeons: Consult with oral surgeons for complex cases requiring advanced surgical intervention.

Case selection မလုပ်ဘဲ လူနာစိတ်တိုင်းကျ သွားတုမြစ်ထည့်ပေးလိုက်တဲ့အတွက် failure တွေ အဖြစ်များတာ တွေ့ရပါတယ်။ နေ့စဉ်ဆေးလိပ်အများကြီးသောက်နေတဲ့လူနာတွေဟာ မကုသခင်ရော၊ ကုသပြီးနောက်မှာပါ နေ့စဉ်ရက်ဆက် ဆေးလိပ်တွေ အလွန်အကျွံသောက်နေရင် သွားမြစ်တုကုသမှုကို ထိခိုက်စေနိုင်ပါတယ်။

နဂိုကတည်းက သွားသန့်ရှင်းရေး သေချာမလုပ်တဲ့လူနာတွေကို သွားမြစ်တုစိုက်ပေးတဲ့အခါ maintenance အပိုင်းကို မကြာခဏပြုလုပ်ပေးသင့်ပါတယ်။ အနည်းဆုံး (၃)လတစ်ခါ ခေါ်ကြည့်ပေးပြီး လိုအပ်တဲ့ကုသမှုတွေကို ပြုလုပ်ပေးသင့်ပါတယ်။ အခြားသွားတွေမှာ သွားဖုံးရောဂါတွေရှိနေရင် သွားဖုံးရောဂါကို အရင်ဆုံး ကုသပေးသင့်ပါတယ်။ သွားသန့်ရှင်းရေး သေသေချာချာ မလုပ်နိုင်တဲ့ လူနာတွေကို သွားမြစ်တုစိုက်ပေးတဲ့အခါ သွားသန့်ရှင်းရေးအတွက် လွယ်ကူစေမယ့်နည်းလမ်းတွေနဲ့ သွားသန့်ရှင်းရေးကိရိယာတွေကို ပြောပြပေးထားရပါမယ်။

သွားမြစ်တုဖြစ်စေ၊ သဘာဝသွားဖြစ်စေ၊ အခြားသွားတုအမျိုးအစားများဖြစ်စေ ဂရုမစိုက်ဘဲ အသုံးပြုလျှင် ပျက်စီးလွယ်ပါတယ်။ သွားမြစ်တုဟာ သွားပိုးမစားပေမယ့် သွားမြစ်တုပတ်လည်မှာရှိတဲ့ အရိုးတွေ တဖြည်းဖြည်းနည်းလာတာ၊ သွားဖုံးတွေရောင်လာတာတွေ ဖြစ်နိုင်ပါတယ်။ ဂရုစိုက်ထိန်းသိမ်းမှု မရှိလျှင် peri-mucositis, peri-implantitis စသဖြင့် ဖြစ်လာပြီး နောက်ဆုံးမှာ တဖြည်းဖြည်း လှုပ်လာပြီး ကျွတ်ထွက်သွားတဲ့အထိ ဖြစ်နိုင်ပါတယ်။

သွားမြစ်တုထည့်မယ့်လူနာရဲ့ လက်ကျန်သွားတွေကို ကြည့်လိုက်တာနဲ့ အဲ့ဒီလူနာရဲ့ သွားကျန်းမာရေးအပေါ် အလေးထားမှု ရှိ-မရှိကို သိနိုင်ပါတယ်။ လူနာကို oral health education သေသေချာချာ ပေးပြီးမှ လိုအပ်တဲ့ကုသမှုတွေကို ပေးသင့်ပါတယ်။ တစ်ချို့ကုသမှုတွေဟာ သွားဆေးခန်းမှာ ဘယ်လောက်ပဲ ကောင်းအောင် လုပ်ပေးပေမယ့် လူနာက ဖြစ်သလိုနေရင် အောင်မြင်တဲ့ကုသမှုကို မဖြစ်စေနိုင်ပါဘူး။

သွားဆရာဝန်ရဲ့ ညွှန်ကြားမှုကို လူနာက မလိုက်နာဘူးဆိုရင် ကုသမှုက ရေရှည်မှာ အောင်မြင်ဖို့ မလွယ်ကူပါဘူး။ လူနာရဲ့ပူးပေါင်းဆောင်ရွက်မှု အပြည့်အဝရရှိမှသာ long term success ကို ရရှိမှာ ဖြစ်ပါတယ်။

6. Important Points in Implant Dentistry

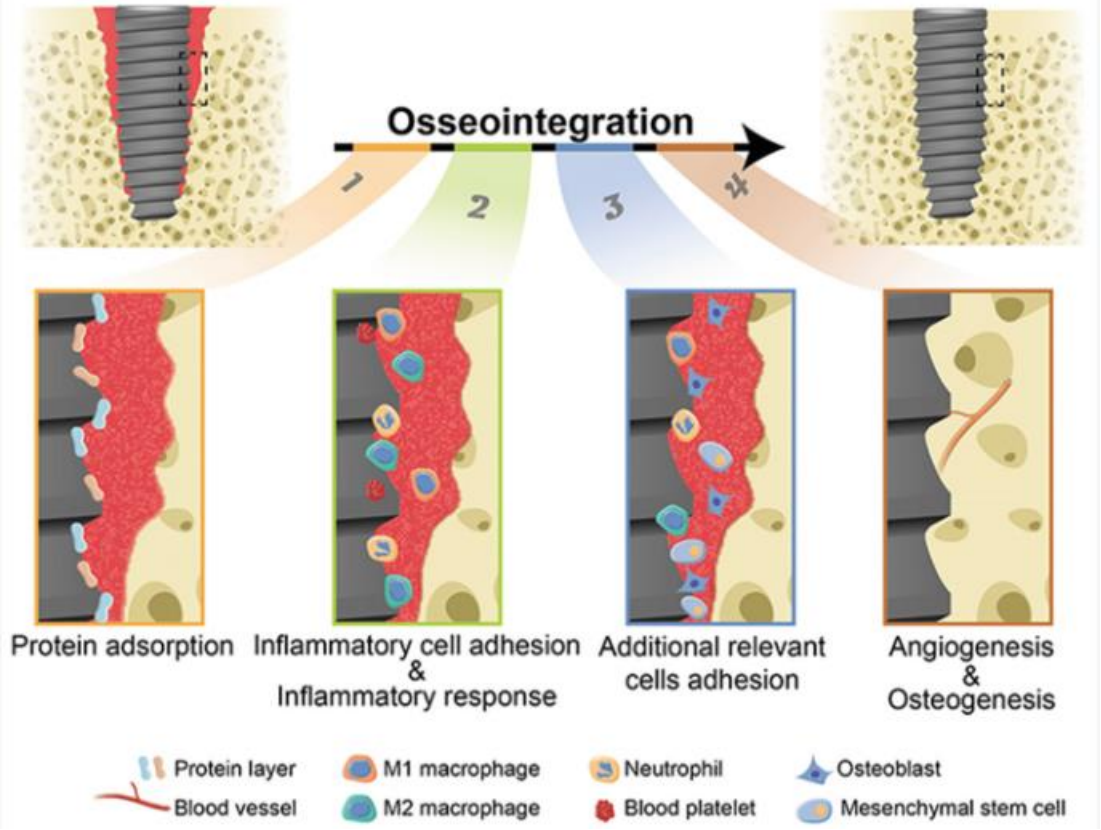
1. Osseointegration

Concept: Direct structural and functional connection between living bone and the surface of a load-bearing artificial implant.

Key Figure: Per-Ingvar Brånemark.

Importance: Foundation of modern dental implants, ensuring stability and long-term success.

Figure 4. Stages of osseointegration around dental implants. Reprinted from Ref. [40].



2. Biomechanics

Concept: Study of forces and their effects on living tissues.

Application: Design and placement of implants to optimize load distribution and minimize stress on bone and prosthetic components.

Importance: Prevents implant failure and ensures longevity.

3. Bone Remodeling

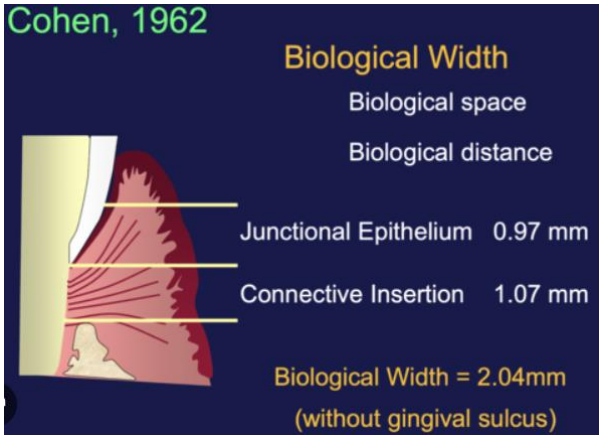
Concept: The continuous process where bone is resorbed and formed.

Relevance: Implants must encourage favorable bone remodeling to maintain bone density and support.

4. Biological Width

Concept: The natural distance maintained by the body between the implant and the alveolar bone.

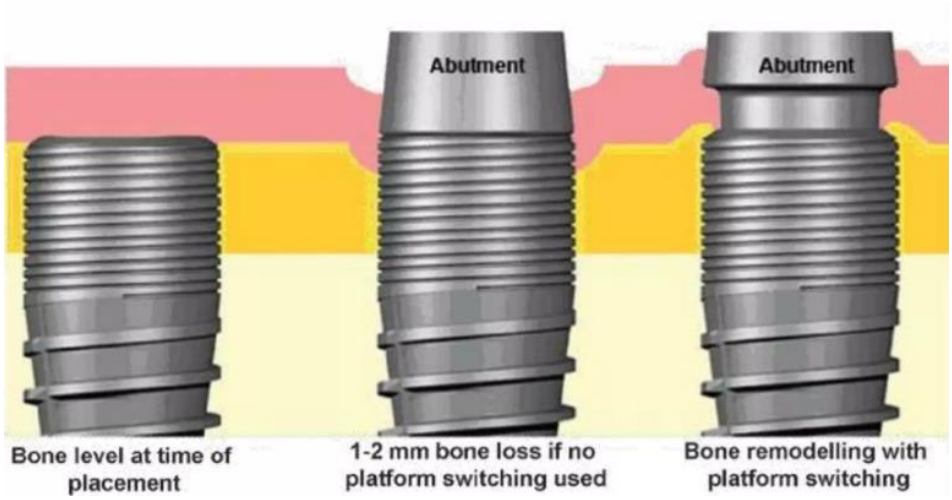
Importance: Ensures healthy gum tissue around the implant and prevents infection.



5. Platform Switching

Concept: Using an implant with a smaller abutment diameter than the implant itself.

Benefits: Reduces bone resorption and preserves peri-implant bone levels.



6. Soft Tissue Integration

Concept: Integration of the soft tissues with the implant surface.

Importance: Critical for preventing peri-implantitis and ensuring aesthetic outcomes.

7. Microgap Theory

Concept: Small gaps at the implant-abutment interface can harbor bacteria.

Solution: Precise manufacturing and fitting to minimize microgaps and reduce infection risk.

8. Immediate Loading

Concept: Placing a functional load on an implant immediately after placement.

Advantage: Reduces treatment time and improves patient satisfaction.

Consideration: Requires careful patient selection and implant stability.

9. Bone Density and Quality

Concept: Variability in bone density affects implant success.

Assessment: Pre-surgical evaluation of bone density to tailor implant choice and placement technique.

10. Host Response

Concept: The body's immune response to the implant material.

Objective: Use biocompatible materials to reduce adverse reactions and enhance osseointegration.

11. Peri-Implantitis

Concept: Inflammatory process affecting the soft and hard tissues around an implant.

Importance: Early diagnosis and management are crucial to prevent implant loss.

12. Stress-Shielding

Concept: Reduction in bone density due to a decrease in normal stress on the bone from the implant.

Relevance: Design of implants must consider mechanical compatibility to avoid bone resorption.

13. Biological Load-Bearing Capacity

Concept: The maximum load that can be applied to an implant without causing damage to the surrounding bone.

Application: Guides the placement and number of implants to ensure long-term success.

14. Surface Modification

Concept: Altering the implant surface to enhance osseointegration.

Techniques: Sandblasting, acid etching, and plasma spraying.

Benefit: Improves bone-implant contact and stability.

15. Bone Augmentation

Concept: Techniques to increase bone volume for implant placement.

Methods: Bone grafting, guided bone regeneration, and sinus lifting.

Importance: Provides adequate bone support for implant placement in deficient areas.

16. Host-Microbe Interactions

Concept: The relationship between the host immune system and microbial flora around the implant.

Objective: Maintain a healthy balance to prevent infections and peri-implant diseases.

17. Digital Implant Dentistry

Concept: Utilization of digital technologies for planning and placing implants.

Tools: CBCT scans, digital impressions, and CAD/CAM.

Advantage: Enhances precision, reduces treatment time, and improves outcomes.

18. Immediate vs. Delayed Placement

Concept: Timing of implant placement following tooth extraction.

Immediate Placement: Implant placed at the time of extraction.

Delayed Placement: Implant placed after a healing period.

Consideration: Based on clinical conditions, immediate placement can reduce overall treatment time and preserve bone structure.

19. All-on-Four Concept

Concept: Use of four strategically placed implants to support a full arch prosthesis.

Benefit: Minimizes the need for bone grafting, reduces surgery time, and lowers costs.

20. Laser-Assisted Implantology

Concept: Use of laser technology in implant surgery.

Advantages: Enhanced precision, reduced bleeding, and faster healing times.

These additional theories further enrich the foundation of implant dentistry, contributing to the evolution and refinement of implant protocols and technologies.

Additional Clinically Important Theories in Implant Dentistry (Continued)

21. Cortical and Cancellous Bone Dynamics

Concept: Understanding the differences in behavior between cortical (dense) and cancellous (spongy) bone.

Importance: Influences implant stability and osseointegration based on bone type at the implant site.

22. Peri-Implant Crestal Bone Loss

Concept: The gradual loss of bone around the crest of the implant.

Factors: Micro-movements, infection, and biomechanical overload.

Prevention: Proper surgical technique, stress management, and regular follow-ups.

23. Biomechanical Occlusion

Concept: Distribution of bite forces on the implant-supported prosthesis.

Application: Designing occlusal surfaces to minimize excessive forces and prevent implant failure.

24. Tissue Engineering and Regenerative Medicine

Concept: Using biological substitutes to restore, maintain, or improve tissue function.

Techniques: Growth factors, stem cells, and scaffolds.

Relevance: Enhances bone and soft tissue regeneration around implants.

25. Role of Systemic Health

Concept: The impact of systemic conditions (e.g., diabetes, osteoporosis) on implant success.

Management: Comprehensive health assessment and tailored treatment plans to address systemic factors.

26. Patient-Specific Implants

Concept: Custom-designed implants to match the patient's unique anatomy.

Technology: 3D printing and CAD/CAM.

Advantage: Improved fit, function, and aesthetics.

27. Nanotechnology in Implant Surfaces

Concept: Using nanostructures to modify implant surfaces at a molecular level.

Benefit: Enhances cellular response, osseointegration, and antibacterial properties.

28. Piezoelectric Surgery

Concept: Use of piezoelectric devices for precise and minimally invasive bone cutting.

Advantages: Reduced trauma, improved healing, and better preservation of soft tissues.

29. Immune Modulation

Concept: Modulating the immune response to enhance implant acceptance.

Methods: Anti-inflammatory treatments and immune-modulatory agents.

Objective: Reduce rejection and improve osseointegration.

30. Photobiomodulation Therapy

Concept: Use of low-level lasers or light therapy to promote healing.

Application: Enhances soft tissue healing and reduces inflammation around implants.

31. Peri-Implant Mucosa Health

Concept: Maintenance of healthy mucosal tissues around implants.

Importance: Critical for preventing peri-implantitis and ensuring long-term success.

32. Pharmacological Interventions

Concept: Use of medications to enhance bone formation and prevent infections.

Examples: Bisphosphonates, antibiotics, and anti-inflammatory drugs.

Relevance: Supports implant integration and longevity.

7.Loading Protocols in Implant Dentistry

လူနာအားလုံးဟာ သွားစိုက်တဲ့အခါ ကုသမှုကို အမြန်ဆုံးပြီးမြောက်လိုကြပါတယ်။ ချက်ချင်းစိုက်၊ ချက်ချင်းစား ဖြစ်လိုကြပါတယ်။ ဖြစ်နိုင်ရင် တစ်ရက်တည်းနဲ့ ပြီးအောင် လုပ်ပေးလို့ မရဘူးလားဆိုပီး မေးလေ့ရှိပါတယ်။ တစ်ချို့လည်း မနက်ဖြန်၊ သဘက်ခါမှာ နိုင်ငံခြားသွားရတော့မှာမို့၊ ခရီးထွက်ရတော့မှာမို့၊ မင်္ဂလာဆောင်တော့မှာမို့ အမြန်လုပ်ပေးဖို့ တောင်းဆိုတတ်ကြပါတယ်။ သွားမြစ်တုစိုက်တဲ့အခါ သွားမြစ်တုရော၊ သွားတုရော တစ်ခါတည်း တပ်ဆင်ပေးဖို့ တောင်းဆိုကြလေ့ရှိပါတယ်။

သွားမြစ်တုထည့်ပြီး အပေါ်ကနေ သွားတုတပ်ဖို့အတွက် ထည့်သွင်းစဉ်းစားရမယ့်အချက်တွေ ရှိပါတယ်။ လူနာရဲ့ အရိုး quality and quantity, primary stability ရှိ-မရှိ၊ အသုံးပြုမယ့် implant design and surface, patient health and compliance, surgical technique တို့ ဖြစ်ပါတယ်။ ယနေ့ခေတ်မှာ ကုမ္ပဏီတွေကနေ immediate loading အတွက် သင့်တော်တဲ့ implant design and surface ကို သပ်သပ်ထုတ်ပေးထားတာတွေ့ရပါတယ်။

Loading Protocols

1. Immediate Loading

Concept: Placing a functional prosthesis on the implant within 48 hours of surgery.

Advantages: Reduces overall treatment time, immediate esthetics, and function.

Considerations: Requires primary stability and adequate bone quality.

2. Early Loading

Concept: Placing a prosthesis on the implant between 1 week and 2 months post-surgery.

Advantages: Balances the need for healing with the desire for quicker function.

Considerations: Suitable for cases with good initial stability and favorable healing conditions.

3. Conventional (Delayed) Loading

Concept: Placing a prosthesis on the implant after a healing period of 3 to 6 months.

Advantages: Ensures complete osseointegration before functional loading.

Considerations: Traditional approach, especially in cases with compromised bone quality or grafting.

4. Progressive Loading

Concept: Gradual increase in functional load on the implant over time.

Advantages: Allows gradual adaptation of bone and soft tissues, reducing the risk of overload.

Considerations: Useful in cases with poor bone quality or when using narrow-diameter implants.

5. Immediate Provisionalization

Concept: Placing a non-functional provisional prosthesis immediately after implant placement.

Advantages: Enhances esthetics and soft tissue management without functional loading.

Considerations: Requires careful occlusal management to avoid premature loading.

6. Delayed Provisionalization

Concept: Placing a non-functional provisional prosthesis after a period of initial healing.

Advantages: Allows for soft tissue healing before provisional restoration.

Considerations: Suitable for esthetic cases requiring careful tissue management.

7. Staged Loading

Concept: Utilizing multiple stages for loading implants, often starting with provisional restorations before final prosthetics.

Advantages: Provides flexibility in treatment planning, allows for adjustments based on initial healing response.

Considerations: May extend overall treatment time but can improve long-term outcomes.

Key Factors Influencing Loading Protocols

Bone Quality and Quantity: Denser, more abundant bone supports earlier loading.

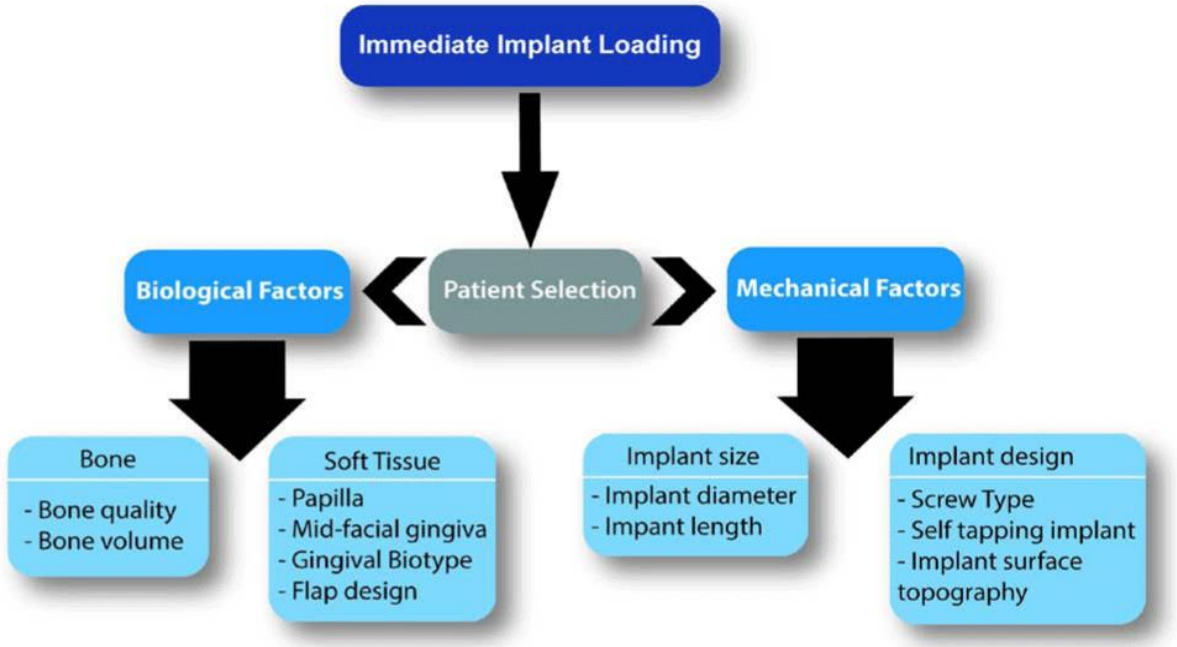
Primary Stability: Higher initial stability favors immediate and early loading.

Implant Design and Surface: Certain designs and surface treatments enhance osseointegration speed.

Patient Health and Compliance: Overall health, smoking status, and adherence to postoperative care impact loading decisions.

Surgical Technique: Techniques that enhance primary stability can support earlier loading.

These loading protocols are selected based on individual patient conditions and treatment goals, aiming to optimize implant success and patient satisfaction.



8. Cement Retention or Screw Retention

Cement retention လုပ်တာကောင်းလား၊ screw retention လုပ်တာ ပိုကောင်းလားဆိုပီး မေးကြလေ့ရှိပါတယ်။ အဲ့ဒီနှစ်ခုထဲက တစ်ခုကို ရွေးချယ်အသုံးပြုဖို့ဆိုတာ သွားမြစ်တုထည့်ထားတဲ့အနေအထားနဲ့ implant location, implant position ကို အရင်ဆုံးကြည့်ရပါမယ်။ သွားမြစ်တုဟာ Aesthetic region မှာ ရှိသလား၊ ထည့်ထားတဲ့ angulation ရော အဆင်ပြေရဲ့လား၊ screw access hole က ဘယ်မှာ ရှိမလဲ၊ angled abutment သုံးထားလား စသဖြင့် ထည့်သွင်းစဉ်းစားရမယ့်အချက်တွေ ရှိပါတယ်။

Cement Retention

Aesthetics: Superior aesthetics due to the absence of a screw access hole, providing a more natural appearance.

Flexibility: Can be used when the implant is not ideally positioned, allowing for correction of angulation.

Passive Fit: Easier to achieve a passive fit which can reduce the risk of mechanical complications.

Occlusal Load: Evenly distributes occlusal load, reducing the risk of screw loosening.

Complications: Risk of cement remnants causing peri-implantitis; meticulous removal of excess cement is crucial.

Retrievability: Difficult to retrieve for maintenance or repair, requiring the crown to be cut off.

Screw Retention

Retrievability: Easy to retrieve for maintenance, repair, or adjustments without damaging the crown.

Complications: Eliminates the risk of cement-related peri-implantitis.

Aesthetics: Potentially compromised aesthetics due to the screw access hole, which can be visible, especially in anterior teeth.

Fit: Achieving a passive fit can be more challenging, increasing the risk of mechanical complications like screw loosening or fracture.

Occlusal Load: Concentrates occlusal forces on the screw, which can lead to loosening or fracture.

Angulation: Limited angulation correction, requiring precise implant placement.

Clinical Considerations

Patient's Aesthetic Demands: Choose cement retention for high aesthetic requirements, especially in the anterior region.

Maintenance and Repair: Opt for screw retention for easier maintenance and future adjustments.

Implant Position: Consider cement retention for non-ideal implant positions to correct angulation.

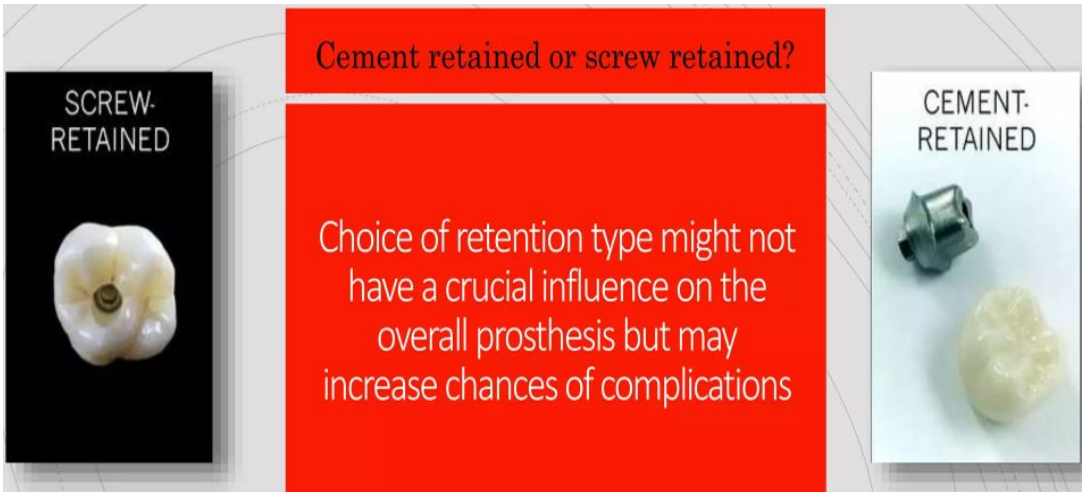
Risk of Peri-implantitis: Use screw retention to eliminate the risk of cement remnants causing inflammation.

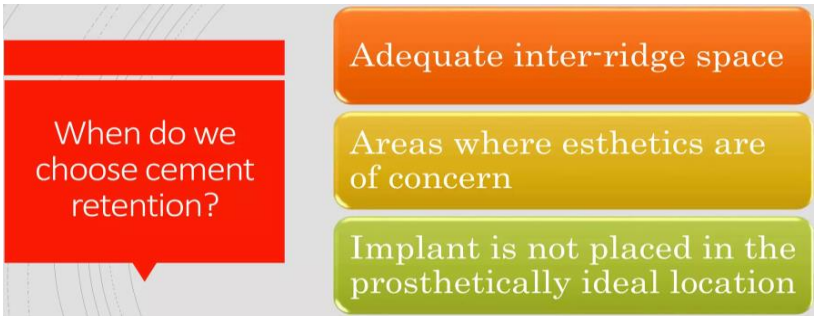
Occlusal Considerations: Evaluate the distribution of occlusal forces and the risk of mechanical complications for each retention method.

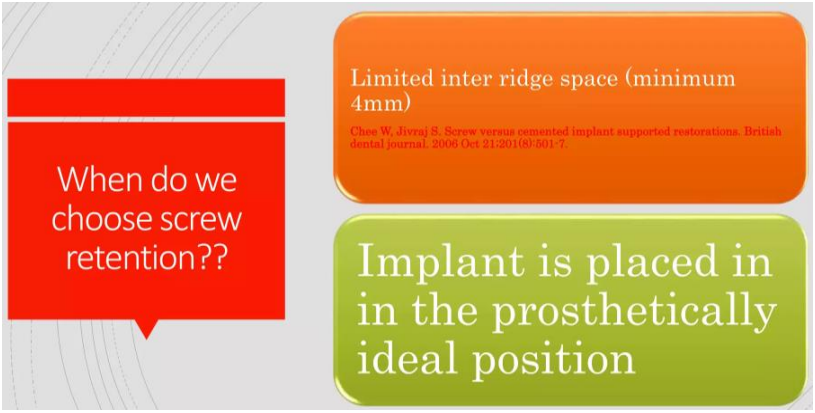
ဘယ်ဟာက ပိုကောင်းတယ်ဆိုတာမျိုး တိတိကျကျ ပြောဖို့ ခက်နိုင်ပါတယ်။ အနေအထားပေါ်မူတည်ပြီး လိုအပ်သလို ရွေးချယ်အသုံးပြုရပါမယ်။

Cement-retained prostheses တွေ သုံးရင် ပိုနေတဲ့ cement တွေကို သေချာဖယ်မထုတ်မိရင် impaction of cement subgingivally during cementation ဖြစ်စေ၊ incomplete seating of the crown ဖြစ်စေနိုင်ပြီး အကျိုးဆက်အနေနဲ့ peri-implant mucositis, peri-implantitis တွေ ဖြစ်နိုင်တယ်လို့ ဆိုကြ ပါတယ်။

Screw-retained prostheses တွေအနေနဲ့ကတော့ trapping cement subgingivally မရှိတဲ့အတွက် cement ကြောင့် peri-implant diseases ဖြစ်ဖို့ နည်းသွားပါတယ်။







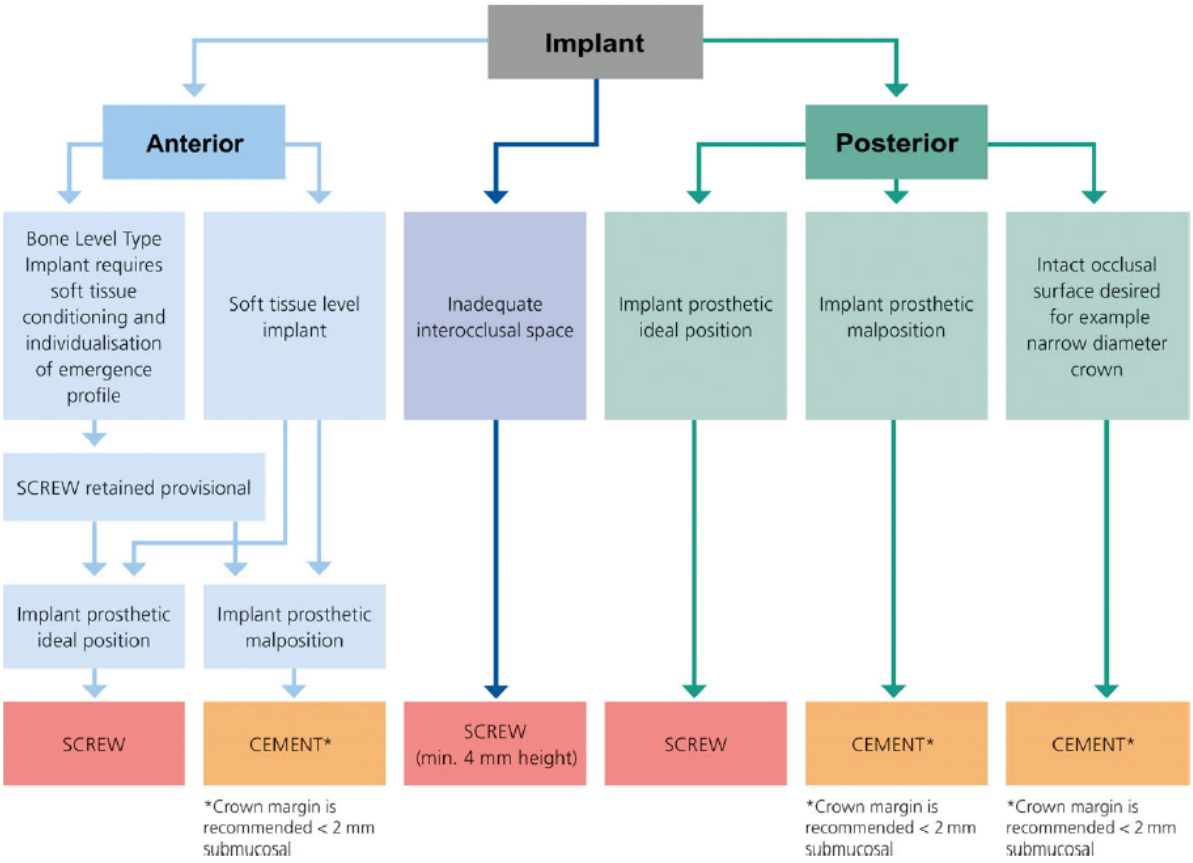


Fig. 1. Decision tree illustrating the pathway of decisions in respect of the indication of screw vs. cementation in fixed prosthodontics supporting implants.

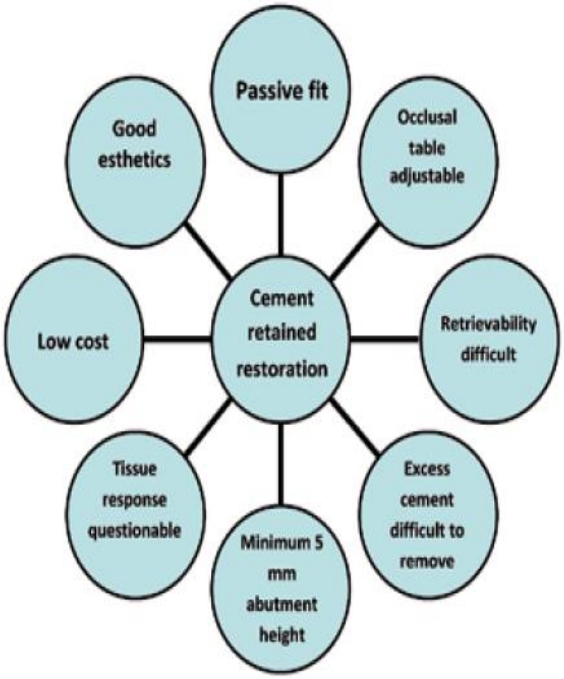


FIG. 4 Advantages and disadvantages of cement-retained prostheses.

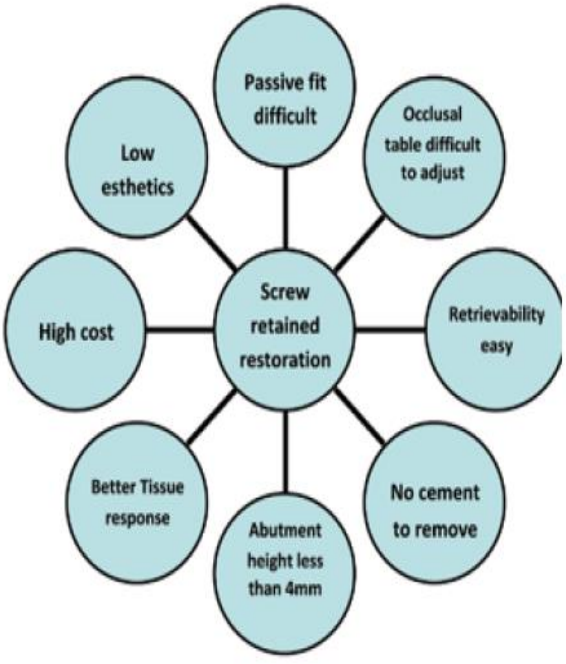
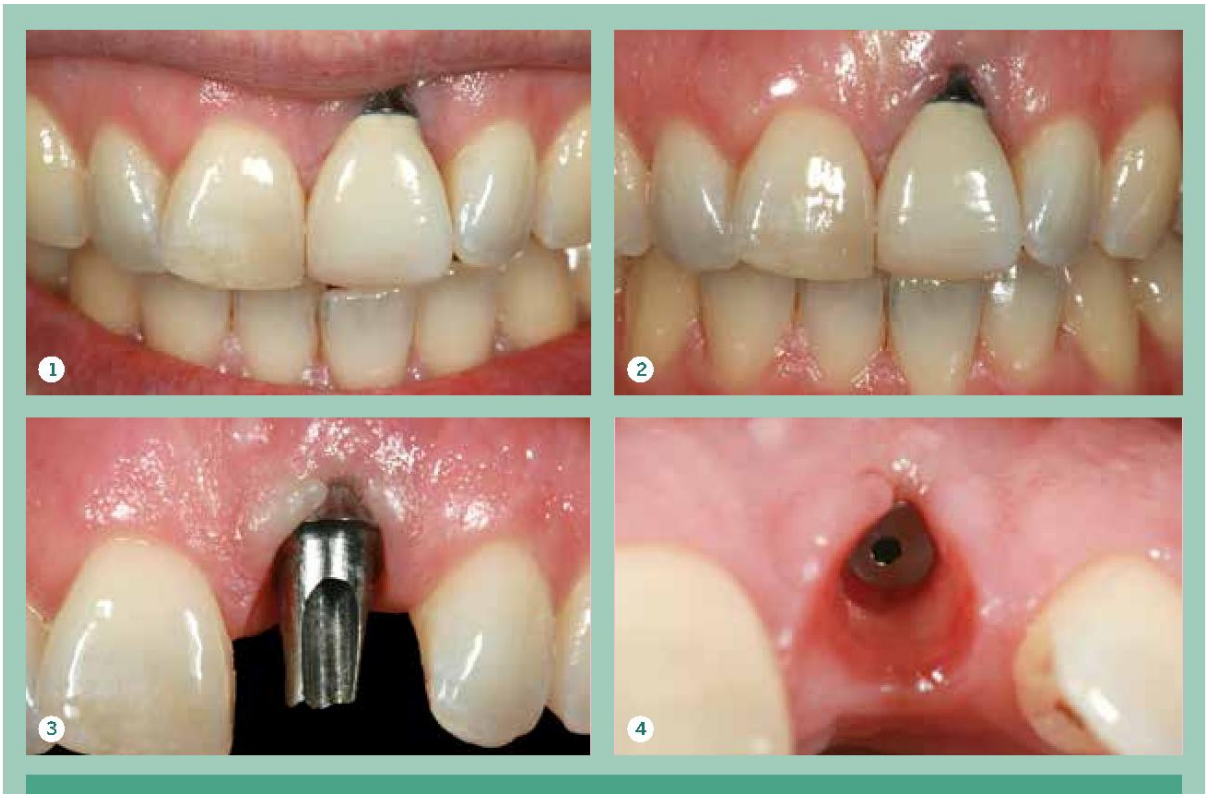


FIG. 5 Advantages and disadvantages of screw-retained prostheses.

9. Implant Therapy in the Esthetic Zone

Esthetic zone မှာ သွားမြစ်တုစိုက်တဲ့အခါ အလှအပအပိုင်းမှာ လူနာစိတ်ကြိုက်ဖြစ်ဖို့ အထူးသတိထားရပါတယ်။ Hard and soft tissue augmentation တွေ လုပ်ပေးမှ အကောင်းဆုံးဖြစ်နိုင်မယ်ဆိုရင်လည်း လူနာကို သေသေချာချာရှင်းပြထားသင့်ပါတယ်။ လိုအပ်နေတဲ့နေရာမှာ Bone graft လည်းမထည့်၊ soft tissue management လည်း မလုပ်ဘဲ သွားမြစ်တုကို ထည့်ခဲ့ရင် အရိုးမရှိလို့ ချိုင့်ဝင်နေတာ၊ soft tissue က ရှိသင့်သလို ရှိမနေလို လှမနေတာတွေ ကြုံရပါတယ်။ Bone and gum tissue loss များလေလေ၊ ideal esthetic result ရဖို့ ခက်လေလေ ဖြစ်ပါတယ်။ Gingival and papillary architecture အကောင်းဆုံးဖြစ်ဖို့ အဖက်ဖက်က စဉ်းစားပြီး ထပ်ခါတပ်ခါ ပြင်ဆင်ကုသပေးရလေ့ရှိပါတယ်။



Factors Affecting Aesthetic Outcome in Implant Dentistry

Implant Positioning

Bucco-lingual Position: Avoid placing implants too buccally to prevent soft tissue recession and exposure of the implant.

Apico-coronal Position: Position the implant at an appropriate depth to ensure optimal emergence profile and soft tissue support.

Mesio-distal Position: Maintain adequate spacing between implants and adjacent teeth to preserve the papilla.

Bone Quality and Volume

Sufficient Bone Volume: Adequate bone height and width are crucial for stable implant placement and support of the surrounding soft tissues.

Bone Grafting: Perform bone grafting if necessary to augment deficient areas and ensure proper implant positioning.

Soft Tissue Management

Gingival Biotype: Thick, keratinized gingiva is more favorable for aesthetic outcomes compared to thin biotype which is prone to recession.

Soft Tissue Grafting: Use connective tissue grafts to enhance the volume and contour of the soft tissue around the implant site.

Provisionalization

Temporary Crowns: Use provisional crowns to shape and maintain the gingival architecture during the healing period.

Immediate Temporization: Place temporary restorations immediately after implant placement to guide soft tissue healing.

Abutment and Crown Design

Custom Abutments: Use custom abutments to achieve optimal gingival contours and support.

Material Selection: Choose high-quality materials like zirconia for abutments and crowns to ensure natural translucency and color.

Crown Emergence Profile: Design the crown with an appropriate emergence profile to support the gingival margin and papillae.

Occlusal Considerations

Balanced Occlusion: Ensure proper occlusal contacts to avoid overloading the implant and surrounding structures.

Functional Harmony: Achieve functional integration with the patient's natural occlusion to prevent mechanical complications.

Patient Factors

Oral Hygiene: Emphasize the importance of meticulous oral hygiene to prevent peri-implant diseases and maintain aesthetic outcomes.

Smoking: Address smoking habits, as smoking can negatively impact healing and the overall aesthetic result.

Surgical Technique

Minimally Invasive Procedures: Use minimally invasive surgical techniques to preserve soft tissue and bone.

Flap Design: Design surgical flaps to minimize trauma and promote optimal soft tissue healing.

Restorative Technique

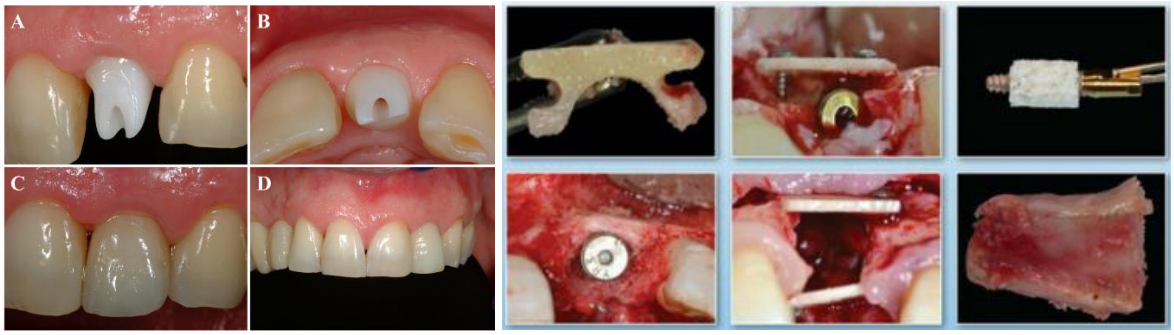
Shade Matching: Precisely match the shade of the crown with adjacent teeth for a seamless appearance.

Surface Texture: Mimic the natural tooth anatomy and surface texture in the final restoration.

Patient Expectations

Realistic Goals: Set realistic expectations regarding the aesthetic outcomes and discuss any limitations with the patient.

Patient Involvement: Involve the patient in decisions about the shade, shape, and appearance of the restoration.



Implants in the anterior maxilla: aesthetic challenges

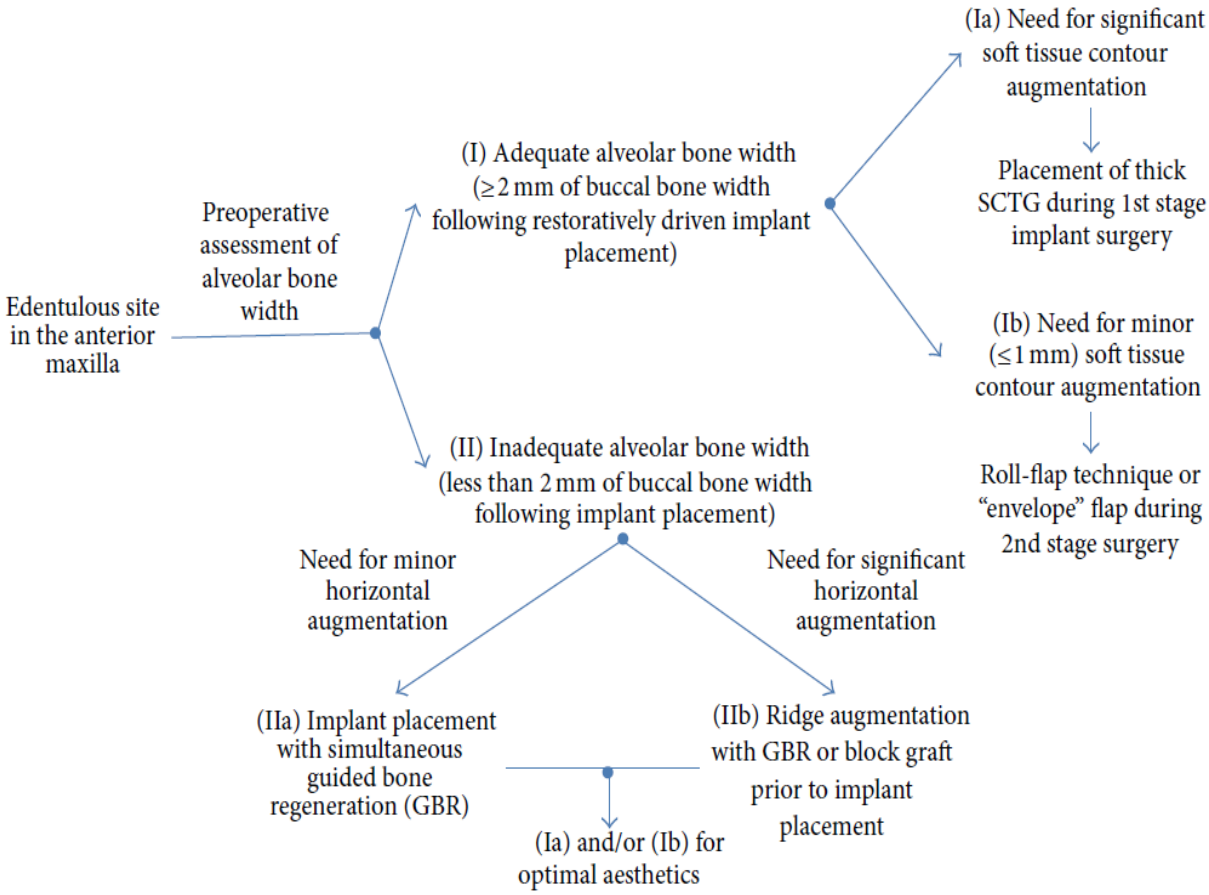


FIGURE 1: Implants in the anterior maxilla: a clinical decision-tree for overcoming aesthetic challenges.

10. Multidisciplinary Approaches or Teamwork

သွားမြစ်တုကုသမှုကို ဖြစ်စေ၊ အခြားသွားနှင့်ခံတွင်းရောဂါကုသမှုများကို ဖြစ်စေ ကုသပေးဖို့ ကြိုးစားတဲ့ အခါ ကုသပေးမယ့်ဆရာဝန်တွေအနေနဲ့ မိမိတတ်ကျွမ်းထားတဲ့ ဘောင်အတွင်းကနေပဲ စဉ်းစားကြလေ့ရှိ ပါတယ်။ တစ်ချို့ဆိုရင် မိမိအားသန်တဲ့ ကုသမှုကိုပဲ ရွေးချယ်အသုံးပြုကြလေ့ရှိပါတယ်။ သွားကျဲနေတာကို veneer အားသန်တဲ့သူက veneer နဲ့ ပြင်ပေး၊ ortho ကျွမ်းကျင်တဲ့သူက ortho နဲ့ ပြင်ပေး၊ composite filling ကိုပဲ လုပ်ချင်သူက composite filling နဲ့ လုပ်ပေး စသဖြင့် တွေ့ရပါတယ်။ ဆရာဝန်အနေနဲ့ ကုသမှုမျိုးစုံကို သိထား၊ ကျွမ်းကျင်ထားတဲ့အခါ လူနာအတွက် အသင့်တော်ဆုံး၊ အကောင်းဆုံးကို ရွေးချယ်အသုံးပြုနိုင်မှာ ဖြစ်ပါတယ်။

ဘာသာရပ်တစ်ခုမှာပဲ အခြေအနေတစ်ခုအတွက် ကုသမှုမျိုးစုံရှိနေတတ်ပါတယ်။ မြင်အောင်ပြောရရင် ortho case တစ်ခုကို သွားဆရာဝန်(၁၀)ဦးက treatment plan ဆွဲကြတဲ့အခါ တစ်ဦးနဲ့တစ်ဦး မတူညီနိုင် ပါဘူး။ မိမိကျွမ်းကျင်ထားတဲ့ treatment approaches တွေ၊ မိမိဆေးခန်းမှာရှိတဲ့ ပစ္စည်းကိရိယာတွေ၊ ကုန်ကျစရိတ်တွေအပေါ် မူတည်ပြီး စဉ်းစားကြလေ့ရှိပါတယ်။ အထူးသဖြင့် မြန်မာနိုင်ငံမှာ ကုသမှုတွေ ပေးတဲ့အခါ multidisciplinary approaches သို့မဟုတ် team work အပေါ် မူတည်ပြီး treatment plan ကို ရေးဆွဲကြလေ့ရှိပါတယ်။ General dentist စဉ်းစားတဲ့ ပုံစံနဲ့ Specialist က စဉ်းစားတဲ့ပုံစံနဲ့လည်း အကြောင်းအရာအလိုက် ကွဲပြားနေပါလိမ့်မယ်။

Implant case တစ်ခုကို စဉ်းစားတဲ့အခါ OMFS surgeon က စဉ်းစားချဉ်းကပ်ပုံ၊ Prosthodontist က စဉ်းစား ချဉ်းကပ်ပုံ၊ Periodontist က စဉ်းစားချဉ်းကပ်ပုံတွေဟာ တူချင်မှ တူပါလိမ့်မယ်။ မိမိအားသန်သလို စဉ်းစား ကြလေ့ရှိပါတယ်။ အရိုးရှိတဲ့နေရာမှာ သွားမြစ်တုကို ရအောင်ထည့်ပြီး prosthetic အပိုင်းမှာ အဆင်ပြေ အောင် ကုသသွားတာမျိုးတွေလည်း တွေ့ရတတ်ပါတယ်။ ဘယ်အဆင့်မှာ ဘယ်လိုဖြေရှင်းမယ်ဆိုတဲ့ treatment plan ထားရှိထားရင် လွယ်တာ၊ ခက်တာပဲ ကွာသွားပြီး နောက်ဆုံးမှာ အောင်မြင်တဲ့ကုသမှုကို ရရှိစေနိုင်ပါတယ်။ Each specialist brings their unique expertise to ensure a comprehensive and successful implant outcome. A multidisciplinary approach in implant therapy leverages the specialized skills of various dental professionals to achieve superior patient care and successful implant outcomes.

''Oral and Maxillofacial Surgeon (OMFS)''

Focus: Surgical aspects, bone quality and quantity, anatomical structures.

Considerations:

Bone Grafting: Need for bone augmentation or sinus lift.

Surgical Site: Ensuring proper healing and minimal complications.

Complexity: Handling complex cases involving significant bone loss or anatomical challenges.

''Prosthodontist''

Focus: Restoration, aesthetics, function.

Considerations:

Prosthetic Design: Ensuring optimal design for aesthetics and functionality.

Occlusion: Proper bite alignment and overall oral function.

Material Choice: Selecting appropriate materials for durability and appearance.

''Periodontist''

Focus: Soft tissue and periodontal health.

Considerations:

Gum Health: Ensuring healthy gingiva around the implant.

Periodontal Disease: Managing and preventing peri-implantitis.

Soft Tissue Management: Achieving proper soft tissue contours and integration.

သွားမြစ်တုကုသမှုပေးဖို့ ကြိုးစားတဲ့အခါ treatment approaches တွေကို များများသိထားလေ၊ ကျယ်ကျယ်ပြန့်ပြန့် ဘက်ပေါင်းစုံက စဉ်းစားနိုင်လေ ကောင်းလေပါပဲ။ မိမိသိသလောက်ပဲ စဉ်းစားပီး ကုသမှုပေးတဲ့အခါ လိုအပ်ချက်ရှိနေသေးတာတွေကို မကြာခဏ ပြန်စဉ်းစားမိနိုင်ပါတယ်။ ဒါ့ကြောင့် complex case တွေကို စဉ်းစားတဲ့အခါ အခြား specialist တွေ၊ team members တွေနဲ့ ဆွေးနွေးညှိနှိုင်းကြည့်ပီးမှ treatment plan ဆွဲပြီးကုသရင် ပိုမိုကောင်းမွန်နိုင်ပါတယ်။

Multidisciplinary Approaches or Teamwork in Implant Therapy

Importance

Comprehensive Care: Ensures all aspects of the patient's oral health are addressed.

Optimal Outcomes: Combines expertise for the best functional and aesthetic results.

Key Components

Collaboration:

OMFS: Focus on surgical placement and bone management.

Prosthodontist: Design and placement of the prosthetic component.

Periodontist: Management of gum health and integration.

Communication:

Regular case discussions and planning meetings.

Shared treatment plans and patient updates.

Integrated Treatment Planning:

Combining surgical, prosthetic, and periodontal perspectives from the outset.

Coordinated sequencing of procedures for efficient and effective treatment.

Benefits

Improved Patient Outcomes: Enhanced functionality, aesthetics, and longevity of implants.

Patient Satisfaction: Comprehensive care leading to higher patient satisfaction.

Reduced Complications: Anticipation and management of potential issues through combined expertise.

Figure 15.1 The basic team

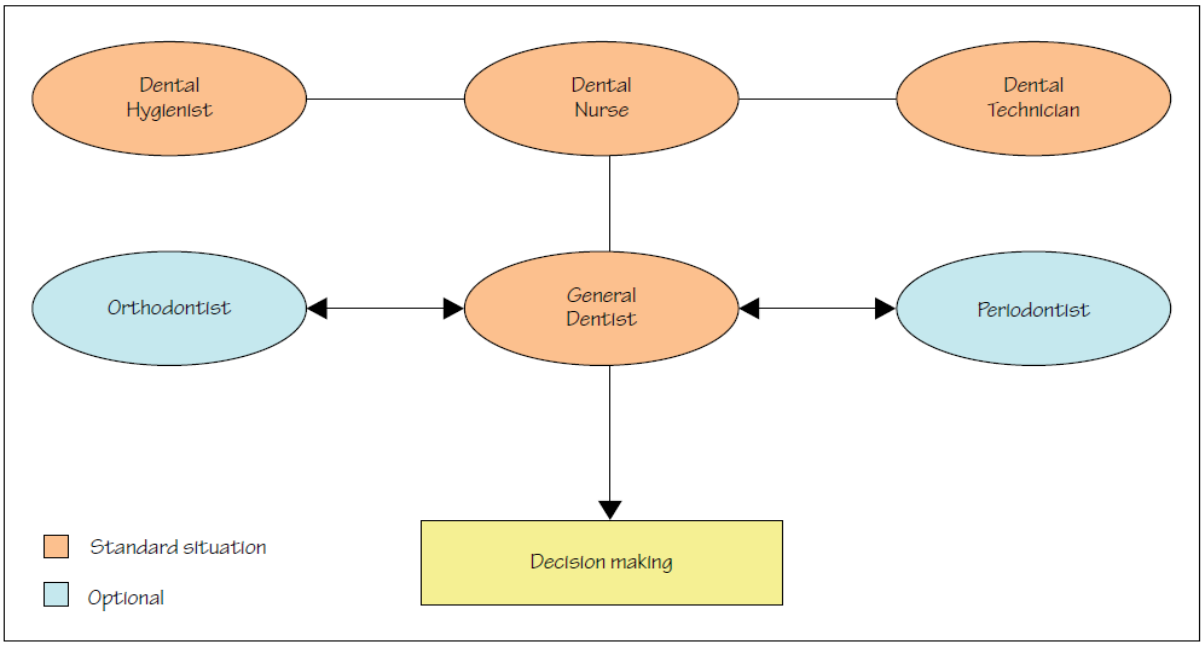
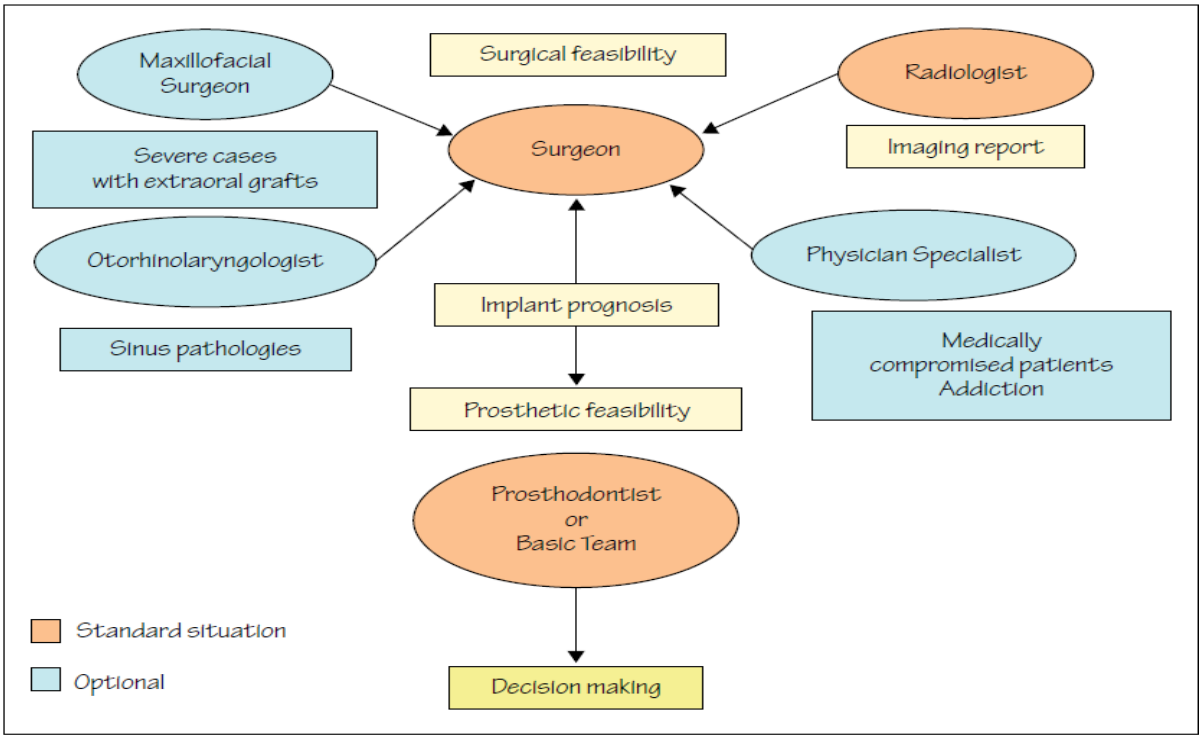
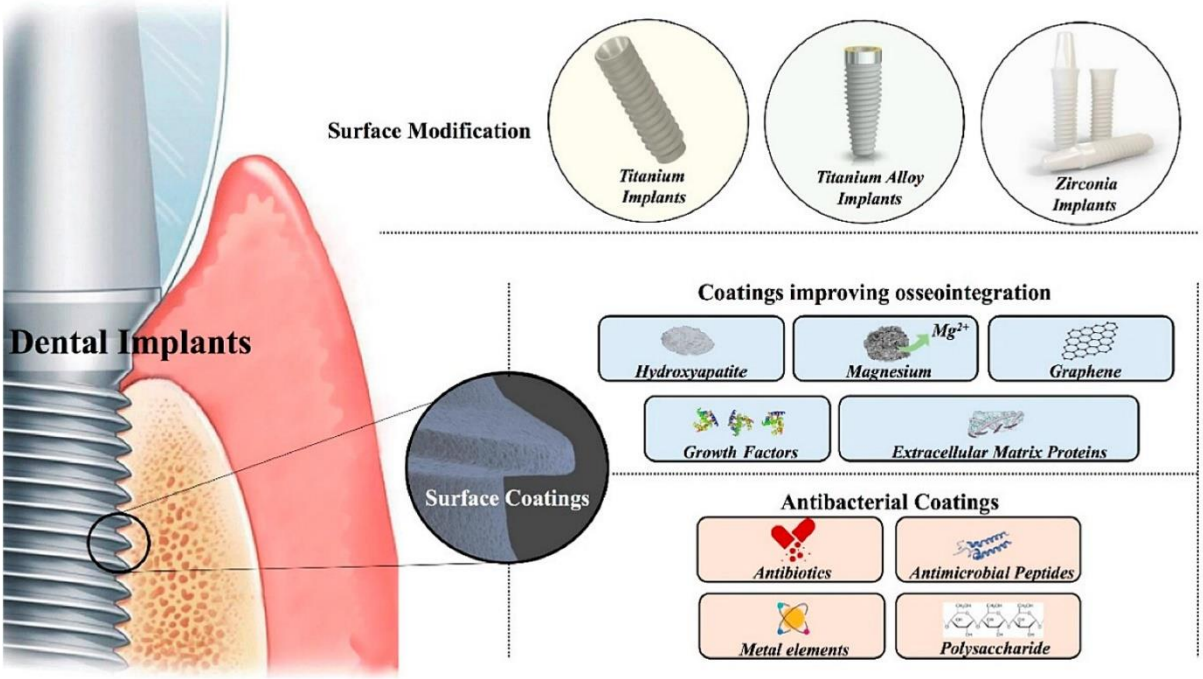


Figure 15.2 The extended team



11. Dental Implant Surface

သွားမြစ်တုကုသမှုကို ပြုလုပ်တဲ့အခါမှာ မိမိအသုံးပြုမယ့် သွားမြစ်တုတွေအကြောင်းကို သေသေချာချာ လေ့လာထားသင့်ပါတယ်။ သွားမြစ်တုထည့်မယ့်နေရာနဲ့ အရိုးအခြေအနေအရ သင့်တော်တဲ့ သွားမြစ်တုကို ရွေးချယ်အသုံးပြုသင့်ပါတယ်။ အထူးသဖြင့် implant fixture design and implant fixture surface တွေရဲ့ သဘောတရားနဲ့ အသုံးပြုပုံတွေကို နားလည်ထားသင့်ပါတယ်။ အရင်ခေတ်က ကျနော်တို့နိုင်ငံမှာ ကုမ္ပဏီက ထုတ်ထားတဲ့ ပစ္စည်းတိုင်းကို ဝယ်ယူဖို့ ခက်ခဲပြီး အသုံးများတဲ့ ပစ္စည်းတွေကိုပဲ ဝယ်ယူလို့ ရနိုင်ပါတယ်။ ဒါ့ကြောင့် ရှိတဲ့ပစ္စည်းကိုပဲ အသုံးပြုပြီး ကုသမှု ပေးခဲ့ကြရပါတယ်။ သေသေချာချာ လေ့လာကြည့်မယ်ဆိုရင် ဘယ်လိုအခြေအနေမှာ ဘယ်လိုသွားမြစ်တုအမျိုးအစားကို အသုံးပြုသင့်တယ်ဆိုတာ နားလည်လာပါမယ်။



Dental Implant Surfaces

Surface Types

Machined (Smooth): Historically common, less surface area for bone integration.

Roughened: Enhances osseointegration by increasing surface area.

SLA (Sandblasted, Large-grit, Acid-etched): Rough texture to promote bone growth.

Plasma-Sprayed: Coated with titanium or hydroxyapatite to increase roughness.

Anodized: Increased oxide layer, enhancing surface roughness and bioactivity.

Laser-Modified: Micro and nano-structured surfaces for improved integration.

Coatings

Hydroxyapatite (HA): Mimics bone mineral, enhancing osseointegration.

Calcium Phosphate: Biocompatible and osteoconductive, facilitating bone growth.

Bioactive Glass: Promotes bone formation and integration.

Surface Treatments

Acid Etching: Creates micro-pits for bone cell attachment.

Sandblasting: Roughens the surface to increase bone contact.

Grit Blasting: Similar to sandblasting, using different materials for roughening.

Nano-Coatings: Nanostructured coatings to enhance cellular response and osseointegration.

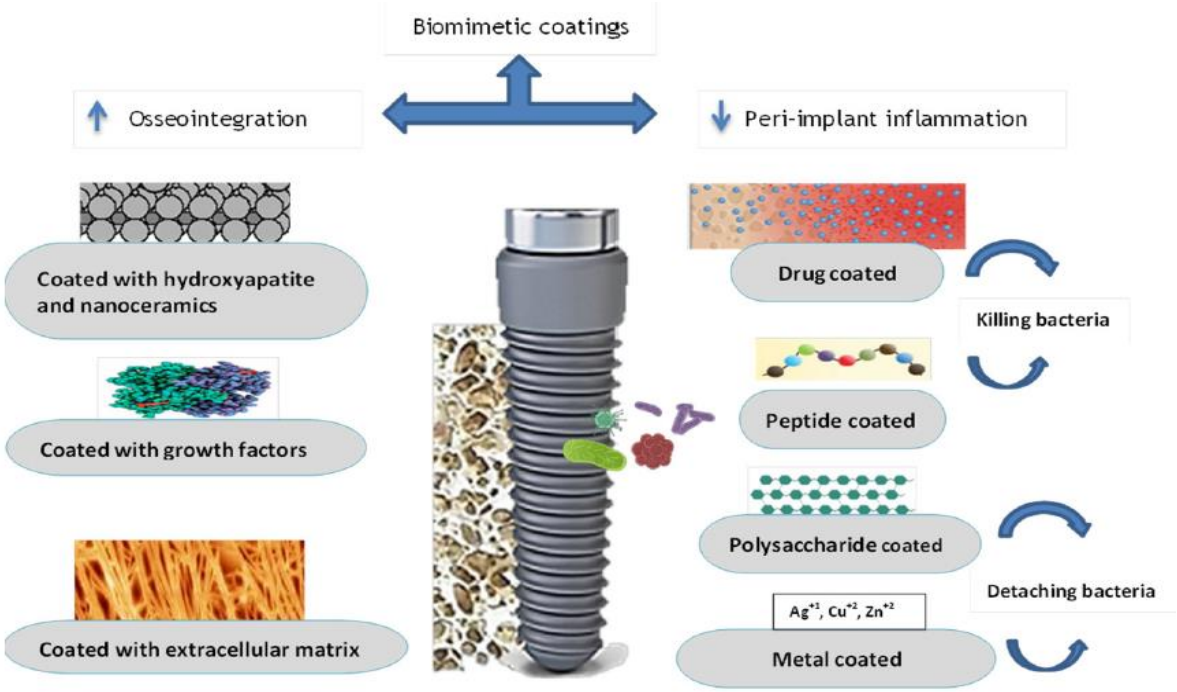


Figure 1. Overview of the review.

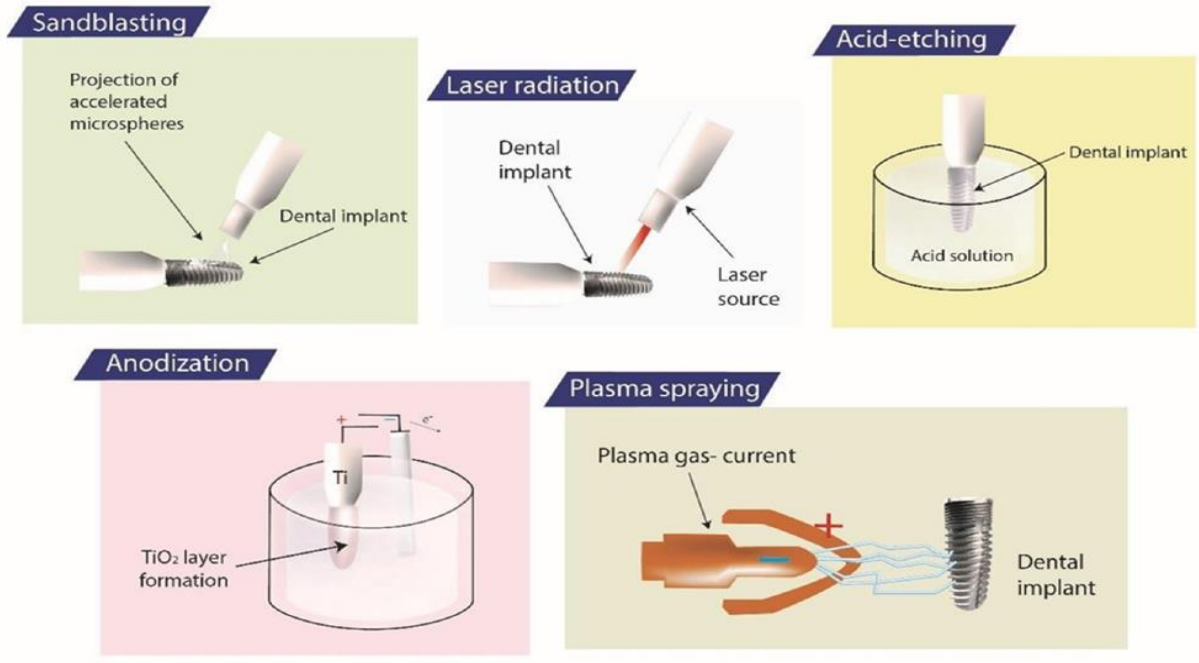


Figure 2. Different techniques of dental-implant surface modifications. Reprinted from Ref. [24].

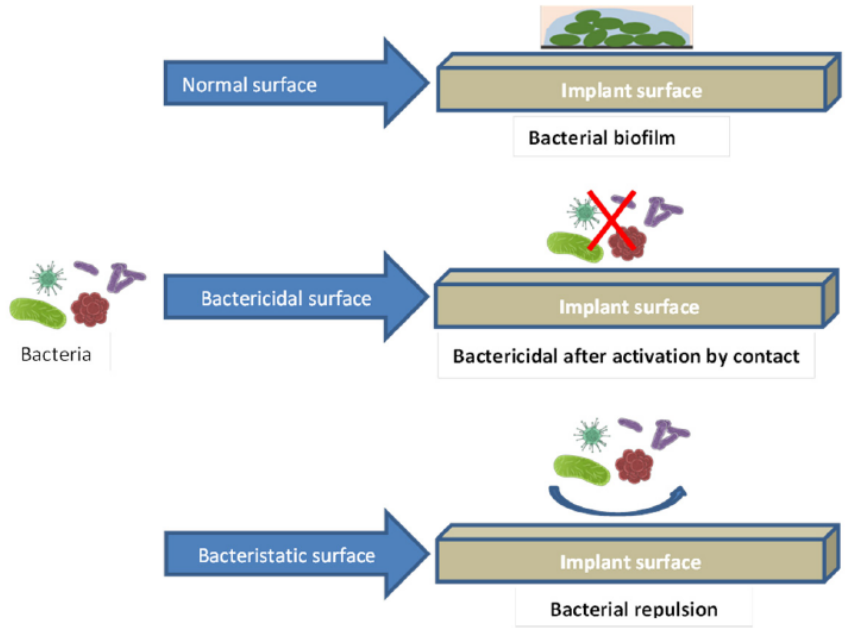
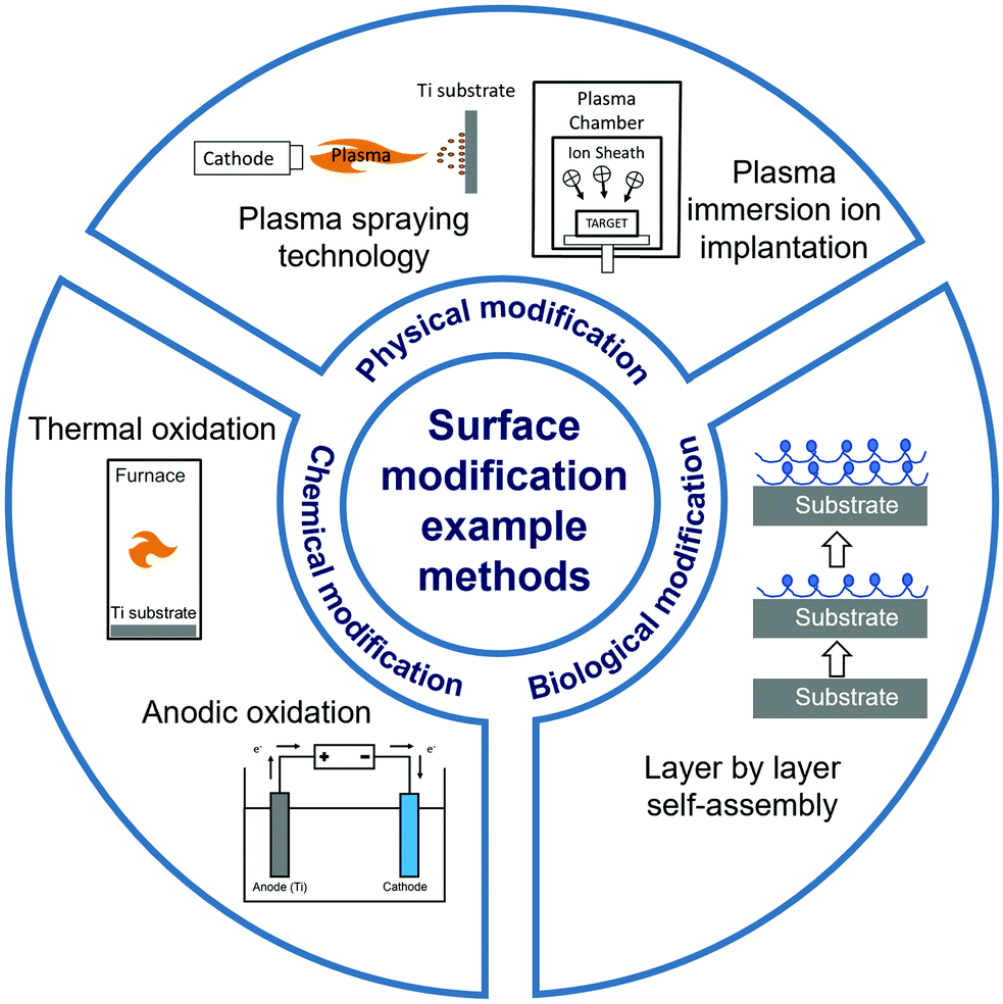


Figure 5. Bacterial interaction with naked implant surface, a bactericidal surface, and a bacteriostatic surface. The red × in the second diagram indicates bactericidal killing bacteria.



12. Dental Implant Fixture Design

သွားမြစ်တုကုသမှုအတွက် fixture design တွေ အမျိုးမျိုးရှိတဲ့အနက် မိမိကုသရမယ့် အနေအထားအရ ရွေးချယ်အသုံးပြုရပါမယ်။ Implant System တစ်ခုရဲ့ catalogue ကို ကြည့်ရင် သွားမြစ်တုအရွယ်အစားမျိုးစုံကို ထုတ်လုပ်ထားသလို လိုအပ်ချက်မျိုးစုံမှာ လိုအပ်သလို ရွေးချယ်အသုံးပြုနိုင်အောင် design အမျိုးအစားစုံအောင် ထုတ်ထားတာ တွေ့ရပါတယ်။ Different implant designs cater to specific clinical needs, enhancing the success and longevity of dental implant therapy through tailored applications based on bone quality, anatomical constraints, and prosthetic requirements.

Different Implant Designs

1. Tapered Implants

Shape: Cone-like, narrows towards the tip.

Uses: Suitable for dense bone and achieving high primary stability, often used in immediate loading protocols.

2. Cylindrical Implants

Shape: Uniform diameter throughout.

Uses: Preferred in medium density bone, providing a balanced distribution of forces.

3. Hybrid Implants

Shape: Combination of tapered and cylindrical features.

Uses: Versatile, suitable for varying bone densities and achieving both stability and load distribution.

4. Narrow-Diameter Implants

Shape: Smaller diameter.

Uses: Ideal for narrow ridges and areas with limited bone width.

5. Wide-Diameter Implants

Shape: Larger diameter.

Uses: Used in soft bone or posterior regions to increase stability and surface area.

6. Short Implants

Shape: Reduced length.

Uses: Suitable for areas with limited vertical bone height, such as in sinus lift situations.

7. Angled Implants

Shape: Implant body with an angled abutment connection.

Uses: Useful for avoiding anatomical structures and providing optimal prosthetic alignment.

8. Platform-Switching Implants

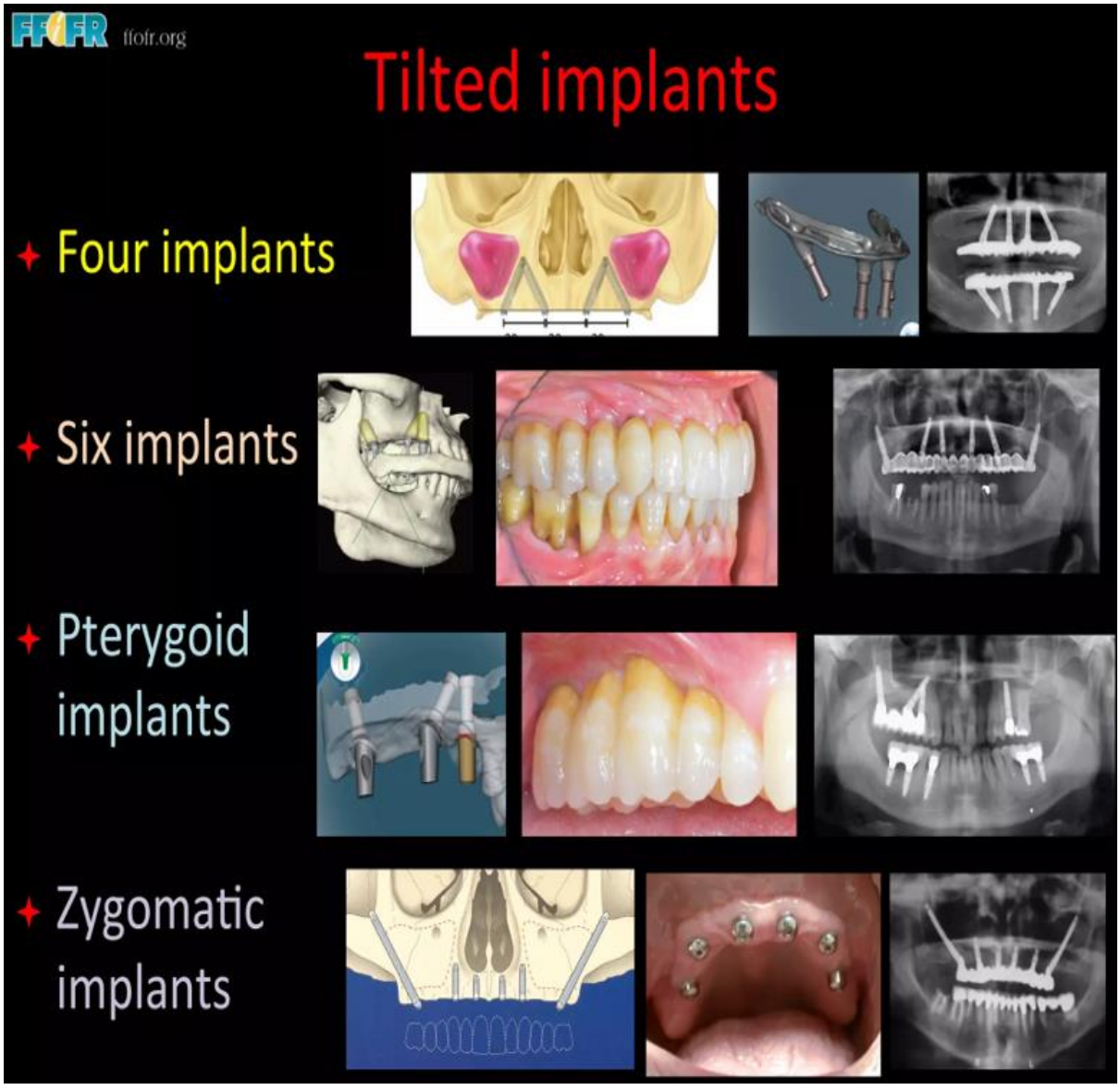
Design Feature: Smaller abutment platform compared to the implant diameter.

Uses: Enhances soft tissue aesthetics and reduces bone resorption.

9. Surface-Modified Implants

Surface Treatment: Various techniques (e.g., SLA, TiUnite).

Uses: Promotes osseointegration, especially beneficial for patients with compromised healing.



13. Immediate Implant Placement

သွားမြစ်တုကို အမြန်စိုက်လိုတဲ့လူနာတွေအတွက် immediate implant placement ကို ပြုလုပ်တဲ့နေရာမှာ indications and contraindications တွေကို သိထားဖို့ အထူးလိုအပ်ပါတယ်။ Immediate မလုပ်သင့်ဘဲ လုပ်လိုက်မိရင် failure ရပြီး လူနာနဲ့ ဆရာဝန်ကြားမှာ အဆင်မပြေတာ ဖြစ်တတ်ပါတယ်။ လူနာဟာ နိုင်ငံခြားကို ထွက်သွားဖို့ အစီအစဉ်မရှိရင်၊ ဆေးခန်းကို ပြန်လာပြဖို့ အဆင်ပြေတဲ့သူဆိုရင် အများအားဖြင့် immediate မလုပ်ဘဲ ပုံမှန်အတိုင်း conventional loading ကို ရွေးချယ်သင့်ပါတယ်။ Immediate implant placement is chosen based on these clinical scenarios to optimize treatment outcomes, ensuring functional and aesthetic benefits while minimizing the need for additional surgical interventions.

Indications

1. **Adequate Bone Quantity and Quality**
   - Sufficient bone volume and density for primary stability.
2. **Non-Infected Extraction Sites**
   - Absence of active infection or severe periodontal disease.
3. **Single Tooth Extraction**
   - Ideal for replacing a single missing tooth with immediate placement.
4. **Healthy Soft Tissue Conditions**
   - Intact and healthy gingiva for optimal healing and aesthetics.
5. **Patient's General Health**
   - Good systemic health with no contraindications to surgery.
6. **Patient Motivation and Compliance**
   - Commitment to postoperative care and maintenance.

Clinical Scenarios for Immediate Implant Placement

1. Single Tooth Extraction

- **Example:** Immediate replacement of a single anterior tooth after extraction due to trauma or decay.
- **Benefit:** Preserves aesthetics and bone structure, providing immediate functional and visual restoration.

2. Multiple Adjacent Teeth Extraction

- **Example:** Replacement of multiple adjacent teeth in the anterior or posterior region.
- **Benefit:** Maintains alveolar bone height and soft tissue contours, reducing the need for additional grafting procedures.

3. Full-Arch Restorations

- **Example:** Immediate placement of implants following extraction of remaining teeth in a severely compromised dentition.
- **Benefit:** Facilitates immediate functional loading and quicker transition to a full-arch prosthesis, often used in All-on-4 or All-on-6 techniques.

4. Non-Infected Extraction Sites

- **Example:** Replacement of teeth extracted due to non-infectious causes such as root fractures or non-restorable caries.
- **Benefit:** Immediate placement in a clean site reduces treatment time and maintains the integrity of the extraction socket.

5. Patients with Adequate Bone and Soft Tissue

- **Example:** Patients with sufficient bone volume and healthy soft tissue conditions, ensuring primary stability and favorable healing.
- **Benefit:** Enhanced outcomes with reduced risk of complications and better aesthetic results.

6. Traumatic Tooth Loss

- **Example:** Immediate implant placement following accidental tooth avulsion or severe trauma.
- **Benefit:** Prevents bone resorption and maintains the natural contour of the alveolar ridge, offering immediate replacement and restoration.

7. Aesthetic Zone Requirements

- **Example:** Immediate placement in the anterior maxilla to address aesthetic concerns promptly.
- **Benefit:** Maintains gingival architecture and provides immediate esthetic restoration, improving patient satisfaction.

Absolute Contraindications for Immediate Implant Placement

1. **Active Infection at the Extraction Site**
    - Presence of acute or chronic infection that could compromise implant osseointegration.
2. **Uncontrolled Systemic Diseases**
    - Conditions such as uncontrolled diabetes, severe cardiovascular disease, or immunocompromised states.
3. **Osteoporosis or Severe Bone Disorders**
    - Conditions that affect bone quality and healing, making primary stability difficult to achieve.
4. **Heavy Smoking**
    - High levels of smoking can impair healing and increase the risk of implant failure.
5. **Bruxism (Severe Teeth Grinding)**
    - Excessive occlusal forces that can compromise implant stability and success.
6. **Insufficient Bone Volume or Quality**
    - Lack of adequate bone to achieve primary stability and support the implant.
7. **Patient Non-Compliance**
    - Inability or unwillingness to adhere to postoperative care and maintenance protocols.
8. **Severe Periodontal Disease**
    - Advanced periodontal conditions that could jeopardize the surrounding bone and soft tissue health.

14. Maxillary Sinus Augmentation

Maxillary sinus augmentation လုပ်ဖို့ လို-မလိုကို လူနာရဲ့ CBCT ကို စစ်ကြည့်ပီးတဲ့အခါ သိနိုင်ပါတယ်။ ပထမဆုံးအနေနဲ့ residual alveolar bone height (subantral space) ဘယ်လောက်ရှိလဲဆိုတာကို တိုင်းကြည့်နိုင်ပါတယ်။

Classifications of Sub-antral Space

Class I

Residual Bone Height: More than 10 mm

Description: Sufficient bone height is available for implant placement without the need for sinus augmentation.

Treatment Approach: Standard implant placement without sinus lift.

Class II

Residual Bone Height: 7-10 mm

Description: Moderate bone height, allowing for the possibility of direct implant placement or minimal sinus augmentation.

Treatment Approach:

Direct implant placement with shorter implants.

Crestal approach (internal sinus lift) if minor augmentation is needed.

Class III

Residual Bone Height: 4-7 mm

Description: Insufficient bone height for direct implant placement, requiring sinus augmentation.

Treatment Approach:

Crestal approach (internal sinus lift) with bone grafting.

Lateral approach (lateral window technique) may be considered based on the surgeon's preference and specific clinical scenario.

Class IV

Residual Bone Height: Less than 4 mm

Description: Severely limited bone height, necessitating significant sinus augmentation before implant placement.

Treatment Approach:

Lateral approach (lateral window technique) is typically required.

Extensive bone grafting to achieve adequate height for future implant placement.

Technique Selection ကို အများအားဖြင့် ရွေးချယ်ခြင်း

Lateral Approach when:

Residual bone height is less than 4-5 mm.

Significant sinus lift height is required.

Complex sinus anatomy or pathology is present.

The patient is healthy enough for a more invasive procedure.

Advanced surgical expertise is available.

Crestal Approach when:

Residual bone height is at least 5-6 mm.

Moderate sinus lift height is sufficient.

Straightforward sinus anatomy is present.

The patient prefers a less invasive procedure with potentially quicker recovery.

Bone quality is relatively good, requiring minimal augmentation.

Surgeon's Expertise:

Choose the approach that aligns with the surgeon's experience and confidence in performing the procedure effectively.

TABLE 11-1 **Surgical classification system for sinus membrane thickness**

Thickness	Appearance	Characteristics	Surgical difficulty	Surgical phases
Thick	Light color (white), no transparency	Sturdy, elastic, eutrophic	Low	One surgery
Medium	Dark color (red/blue), slightly transparent	Delicate, elastic, normotrophic	Medium	One surgery
Thin	Colorless, transparent	Fragile, inelastic, atrophic	High	Two surgeries

Sinus Membrane Perforation and Management

Small Perforation

Size: Less than 5 mm.

Management:

Use a collagen membrane or resorbable membrane to cover the perforation.

Proceed with sinus augmentation carefully to avoid enlarging the perforation.

Moderate Perforation

Size: 5-10 mm.

Management:

Place a resorbable collagen membrane over the perforation.

Secure the membrane with sutures or tissue adhesive if necessary.

Consider using a fibrin sealant to promote healing.

Proceed cautiously with sinus augmentation.

Large Perforation

Size: Greater than 10 mm.

Management:

Use a large collagen membrane or a double-layer technique to cover the perforation.

Secure the membrane with sutures or tissue adhesive.

Consider delaying the augmentation procedure to allow for membrane healing if the perforation is extensive.

If immediate augmentation is necessary, use careful techniques to prevent further damage.

Management Techniques

Collagen Membrane

A resorbable collagen membrane can be placed over the perforation to protect the sinus lining and support healing.

Secure the membrane with sutures or tissue adhesive for stability.

Fibrin Sealant

Apply fibrin sealant to the perforation site to promote clot formation and healing.

Useful for moderate perforations to enhance membrane repair.

Double-Layer Technique

For larger perforations, use a double-layer approach with two collagen membranes to provide extra support and coverage.

Ensure the membranes are well-secured to prevent displacement during augmentation.

Delayed Augmentation

In cases of extensive perforation, consider postponing the sinus augmentation to allow the membrane to heal.

Schedule a follow-up procedure after sufficient healing has occurred.

Clinical Considerations for Sinus Septum in Sinus Augmentation

Preoperative Assessment: Use CBCT to evaluate septum location and size.

Surgical Approach: Prefer Lateral Window Technique. Consider multiple windows if the septum divides the sinus.

Instrumentation: Utilize piezosurgery for precise cutting.

Membrane Elevation: Elevate gently around the septum. Partial removal of septum if necessary.

Grafting: Place graft material in separate compartments if divided. Use collagen membranes for support.

Postoperative Care: Regular follow-ups. Prescribe antibiotics and anti-inflammatories.

Patient Communication: Inform about septum impact. Discuss surgical plan and expectations.

Key Points:

Experienced surgeon required.

Adapt plan intraoperatively if needed.

Consider alternative techniques if septum poses significant challenges.

Contraindications for Sinus Lift

Acute Sinusitis: Active infection in the sinus.

Chronic Sinusitis: Persistent or recurrent sinus infections.

Sinus Tumors or Cysts: Presence of benign or malignant growths.

Uncontrolled Systemic Diseases: Uncontrolled diabetes, hypertension, or cardiovascular conditions.

Severe Allergies or Rhinitis: Chronic allergic reactions affecting the sinus.

Poor Oral Hygiene: High risk of infection due to inadequate dental care.

Radiotherapy to the Head/Neck: History of radiation treatment in the sinus area.

Substance Abuse: Active alcohol or drug abuse affecting health.

Osteoporosis/Osteopenia: Severe bone density issues impacting bone healing.

Immune System Disorders: Conditions like HIV/AIDS or immunosuppressive therapy.

Bleeding Disorders: Hemophilia or other coagulation disorders.

Psychiatric Disorders: Severe mental health conditions affecting cooperation and postoperative care.

Key Points:

Comprehensive preoperative assessment is essential.

Consult relevant specialists if contraindications are suspected.

Consider alternative treatment plans if contraindications are present.

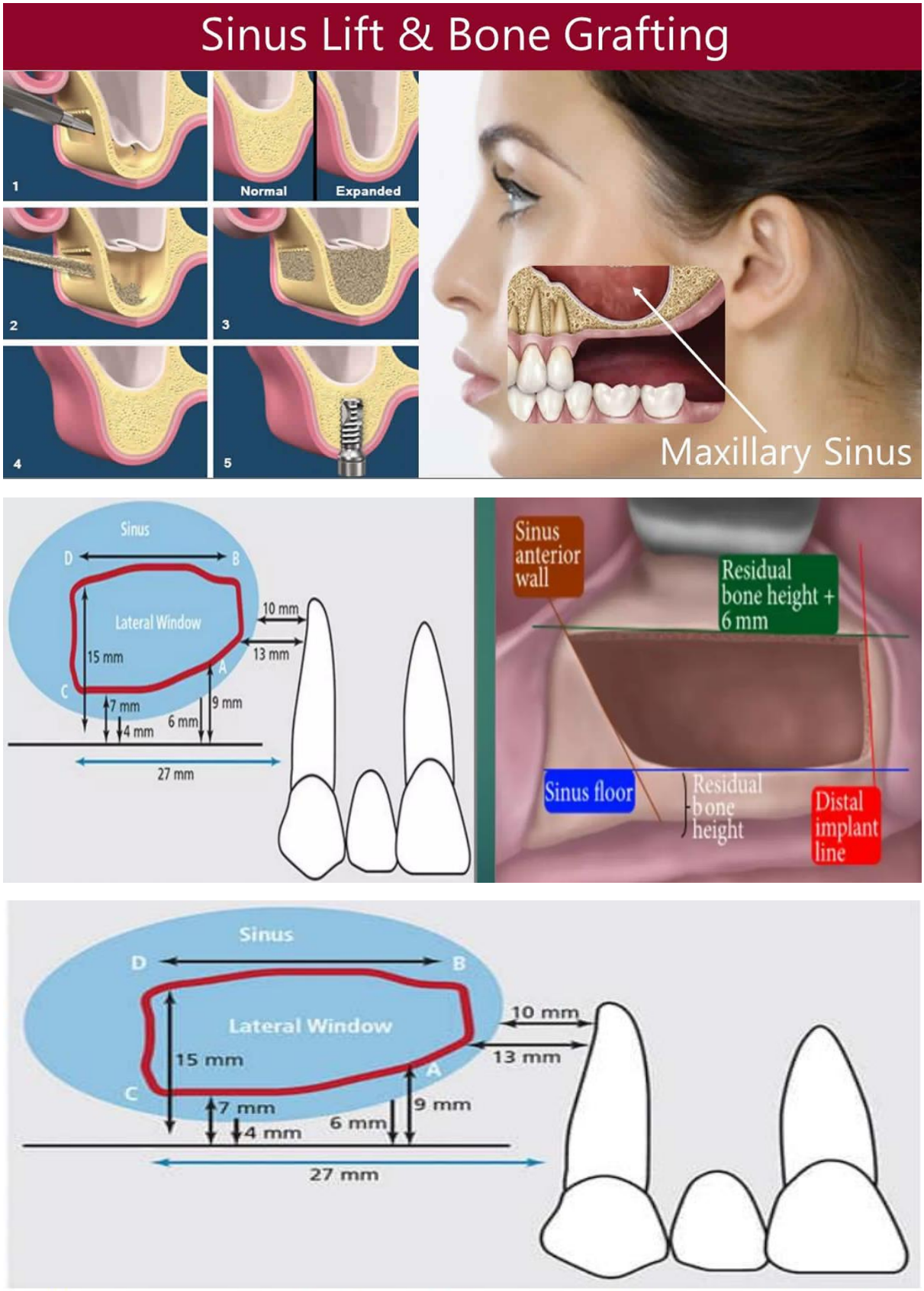


FIGURE 4. In this mapping of the maxillary right sinus for a window, the red line demarcates the boundaries of the lateral window, while the blue shading denotes the extent of the sinus. The extent of the lateral window is defined by four points: (A) inferior point of anterior osseous cut, (B) superior point of anterior osseous cut, (C) inferior point of posterior cut, and (D) superior point of posterior cut.

15. Anatomical Considerations

သွားမြစ်တုနဲ့ပတ်သက်တဲ့ သင်တန်းတွေ တက်အပြီးမှာ beginner တွေအနေနဲ့ လက်တွေ့စလုပ်ဖို့ case selection လုပ်တဲ့အခါ hard and soft tissue augmentation လုပ်စရာမလိုဘဲ သွားမြစ်တုကို အေးအေးဆေးဆေး ထည့်လို့ရတဲ့ကေ့စ်တွေကို စတင်လုပ်နိုင်ပါတယ်။ အဲ့လိုကေ့စ်တွေကို စတင်လုပ်ရင်း implant procedures တွေကို step-by-step မှတ်မိလာပြီး အကျွမ်းတဝင်ဖြစ်လာတဲ့အခါ bone augmentation လုပ်ဖို့ လိုအပ်တဲ့ကေ့စ်တွေကို တဆင့်တက်ပြီး လုပ်နိုင်ပါတယ်။ ကေ့စ်တွေလုပ်ရင်း သဘောတရားတွေကို ခြုံငုံမိလာတဲ့အခါ hard and soft tissue augmentation လုပ်ဖို့ လိုအပ်တဲ့ ကေ့စ်တွေကို လုပ်သင့်ပါတယ်။ ဒီအခန်းမှာတော့ anatomical limitations တွေအကြောင်းကို ဖော်ပြပေးမှာ ဖြစ်ပါတယ်။ Anatomical structures တွေနဲ့ပတ်သက်ပြီး ဆောင်ရန်၊ရှောင်ရန်တွေကို သိထားရင် သွားမြစ်တုထည့်ရတာ ပိုအဆင်ပြေလာပါလိမ့်မယ်။

Challenges Due to Anatomical Limitations in Implant Placement

1. **Insufficient Bone Volume**
    - **Vertical Deficiency**: Requires bone grafting or sinus lift.
    - **Horizontal Deficiency**: May need ridge augmentation procedures.
2. **Proximity to Vital Structures**
    - **Nerves**: Risk of nerve damage leading to numbness or pain.
    - **Sinuses**: Perforation risk, complicating implant stability.
    - **Blood Vessels**: Risk of excessive bleeding or hematoma formation.
3. **Bone Quality**
    - **Density Variations**: Poor primary stability, requiring longer healing times or additional support.
4. **Anatomical Variations**
    - **Nasal Cavity and Sinus Septa**: Complicate accurate implant positioning.
    - **Maxillary Sinus Pneumatization**: Limits available bone height, requiring advanced surgical techniques.
5. **Soft Tissue Considerations**
    - **Gingival Thickness**: Insufficient tissue may lead to aesthetic and functional issues.
    - **Mucosal Health**: Poor quality soft tissue can affect healing and implant success.
6. **Tooth Position and Angulation**
    - **Adjacent Teeth**: Limited space can lead to improper implant angulation or positioning.
    - **Root Proximity**: Risk of damaging adjacent roots, leading to potential tooth loss.

Complications

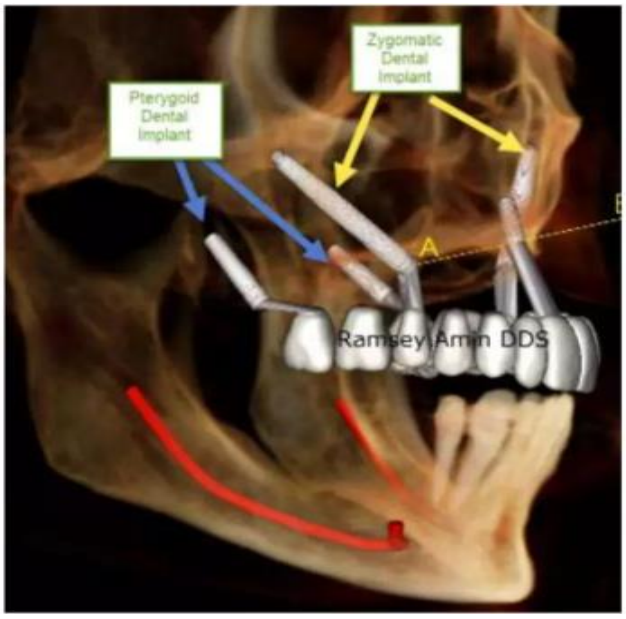
1. **Nerve Injury**
    - **Symptoms**: Numbness, tingling, or pain.
    - **Cause**: Damage to the inferior alveolar nerve or mental nerve.
2. **Sinus Perforation**
    - **Symptoms**: Chronic sinusitis, implant instability.
    - **Cause**: Implant invading the maxillary sinus.
3. **Inadequate Bone Density**

- **Symptoms**: Poor primary stability, implant failure.
- **Cause**: Low bone quality affecting osseointegration.

4. **Bone Resorption**
   - **Symptoms**: Implant mobility, aesthetic issues.
   - **Cause**: Progressive bone loss around the implant.
5. **Soft Tissue Complications**
   - **Symptoms**: Recession, poor aesthetics, infection.
   - **Cause**: Insufficient keratinized tissue, improper soft tissue management.
6. **Peri-implantitis**
   - **Symptoms**: Inflammation, bone loss around the implant.
   - **Cause**: Bacterial infection, poor oral hygiene.

Management

1. **Nerve Injury**
   - **Prevention**: Accurate imaging, careful surgical planning.
   - **Treatment**: Medications, nerve repair surgery if necessary.
2. **Sinus Perforation**
   - **Prevention**: Preoperative sinus lift or grafting.
   - **Treatment**: Antibiotics, sinus membrane repair, grafting.
3. **Inadequate Bone Density**
   - **Prevention**: Preoperative bone grafting, use of wider or longer implants.
   - **Treatment**: Bone augmentation procedures, use of bone substitutes.
4. **Bone Resorption**
   - **Prevention**: Adequate initial bone volume, proper implant placement.
   - **Treatment**: Bone grafting, guided bone regeneration.
5. **Soft Tissue Complications**
   - **Prevention**: Adequate soft tissue coverage, proper flap design.
   - **Treatment**: Soft tissue grafts, improved oral hygiene protocols.
6. **Peri-implantitis**
   - **Prevention**: Regular maintenance, good oral hygiene.
   - **Treatment**: Debridement, antimicrobial therapy, surgical intervention if severe.



Clinical Conditions for Using Zygomatic, Pterygoid, and Basal Implants

Zygomatic Implants

1. **Severe Maxillary Atrophy**:
   - Indicated when there is insufficient bone in the posterior maxilla.
2. **Previous Maxillectomy**:
   - Used in patients with extensive maxillary resections, often due to tumors.
3. **Sinus Pneumatization**:
   - Suitable when maxillary sinus anatomy precludes conventional implants.
4. **Failed Bone Grafting**:
   - Option when previous bone grafting procedures have failed.

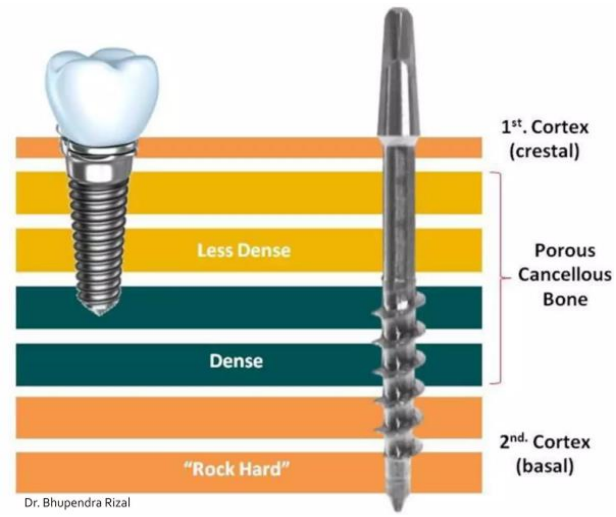
Pterygoid Implants

1. **Posterior Maxillary Atrophy**:
   - Indicated when there is inadequate bone in the posterior maxilla.
2. **Avoiding Sinus Augmentation**:
   - Used to bypass the need for sinus lift procedures.
3. **Immediate Loading**:
   - Ideal for immediate function in edentulous maxillae.

Basal Implants

1. **Extreme Bone Resorption**:
   - Used when conventional implants are not feasible due to severe bone loss.
2. **Immediate Loading**:
   - Suitable for providing immediate function in compromised bone conditions.
3. **Periodontally Compromised Patients**:
   - Ideal for patients with poor bone quality due to periodontal disease.
4. **High-Risk Patients**:
   - Used in patients with systemic conditions affecting bone density and healing.

Implantology starts where others gave up. Basal implants also offer a unique opportunity for the implantologist to treat cases which cannot be treated with the conventional implant systems.



16. Types of Implants

Based on Implant Design

1. **Endosteal Implants**
   - Most common type
   - Placed in the jawbone
   - Types include screw (threaded), cylinder (smooth), or blade types
2. **Subperiosteal Implants**
   - Placed under the gum but above the jawbone
   - Used for patients who cannot wear conventional dentures or have minimal bone height
3. **Zygomatic Implants**
   - Anchored in the cheekbone (zygomatic bone)
   - Used in cases of severe bone loss in the upper jaw

Based on Surface

1. **Smooth Surface Implants**
   - Less susceptible to bacterial adhesion
   - Less surface area for bone integration
2. **Textured or Rough Surface Implants**
   - Improved bone integration
   - Higher surface area for bone to attach
3. **Coated Surface Implants**
   - Coatings may include hydroxyapatite, titanium plasma spray, or bioceramic

- Promotes faster osseointegration

Based on Materials

1. **Titanium Implants**
   - Biocompatible
   - Corrosion-resistant
   - Most commonly used material
2. **Zirconia Implants**
   - Metal-free, suitable for patients with metal allergies
   - Aesthetic benefits (tooth-colored)
   - High strength and biocompatibility

Based on Connection Type

1. **External Hex Connection**
   - Traditional design
   - Simple to use but may have higher mechanical complications
2. **Internal Hex Connection**
   - More stable
   - Reduces the risk of implant loosening
3. **Morse Taper Connection**
   - Provides a tight, stable connection
   - Minimizes micro-movement and bacterial infiltration

Based on Loading Time

1. **Immediate Loading Implants**
   - Placed and restored in a single visit
   - Suitable for patients with adequate bone density
2. **Early Loading Implants**
   - Loaded with a dental prosthesis after a few weeks
   - Balances between immediate and delayed loading
3. **Delayed Loading Implants**
   - Prosthesis placed after a healing period (usually 3-6 months)
   - Ensures stable osseointegration before loading

Based on Implant Shape

1. **Conical Implants**
   - Tapered shape
   - Mimics the natural shape of tooth roots
   - Provides better primary stability
2. **Cylindrical Implants**
   - Straight, uniform shape
   - Commonly used in softer bone

Based on Implant Size

1. **Standard Implants**

    - Diameter typically ranges from 3.5 to 4.2 mm
    - Suitable for most patients
2. **Wide Implants**
    - Diameter greater than 4.2 mm
    - Used in areas with sufficient bone width and for molar regions
3. **Narrow Implants**
    - Diameter less than 3.5 mm
    - Suitable for areas with limited bone space or for replacing smaller teeth

Based on Implant Stage

1. **One-Stage Implants**
    - Placed and left exposed in a single surgical procedure
    - Healing cap is attached immediately
2. **Two-Stage Implants**
    - Placed in the bone and covered by the gum tissue
    - Requires a second surgery to attach the abutment

Based on Bone Augmentation Techniques

1. **Bone Grafting Implants**
    - Used in conjunction with bone grafting procedures
    - Suitable for patients with insufficient bone volume
2. **Sinus Lift Implants**
    - Used in the upper jaw where the sinus cavity is close to the bone
    - Sinus lift procedure is performed to create space for the implant
3. **Ridge Expansion Implants**
    - Used when the jawbone is not wide enough to support an implant
    - Ridge expansion procedure widens the bone to accommodate the implant

Based on Implant Abutment Connection

1. **Angulated Abutment Implants**
    - Used to correct the angulation of implants
    - Suitable for aesthetic zones and complex cases
2. **Custom Abutment Implants**
    - Tailored to fit the specific anatomy of the patient
    - Provides optimal fit and aesthetics

Based on Innovative Designs and Technologies

1. **Mini Dental Implants (MDIs)**
    - Smaller in diameter (usually less than 3 mm)
    - Used for stabilizing dentures or in situations with limited bone
2. **Short Implants**
    - Shorter in length but wider in diameter
    - Suitable for areas with limited vertical bone height
3. **Immediate Placement Implants**
    - Placed immediately after tooth extraction
    - Reduces the total treatment time and preserves the bone

4. **Guided Implants**
    - Placed using computer-aided design/computer-aided manufacturing (CAD/CAM) technology
    - Ensures precise placement based on digital imaging

Based on Surface Treatment and Coatings

1. **Anodized Implants**
    - Surface is anodized to increase oxide layer thickness
    - Improves osseointegration and bone response
2. **Nanotechnology Coatings**
    - Uses nanostructured surfaces to enhance bone attachment
    - Promotes faster healing and stronger integration
3. **Bioactive Coatings**
    - Includes coatings like bioglass or bioactive peptides
    - Enhances bone healing and integration

Based on Implant Restoration

1. **Single-Tooth Implants**
    - Used to replace individual missing teeth
    - Supports a single crown
2. **Multiple-Tooth Implants**
    - Supports fixed bridges or partial dentures
    - Used when several teeth are missing
3. **Full-Arch Implants**
    - Supports full-arch prostheses
    - Used in cases of complete edentulism

Based on Implant Retention Mechanism

1. **Screw-Retained Implants**
    - Prosthesis is attached to the implant with screws
    - Easier to remove and adjust
2. **Cement-Retained Implants**
    - Prosthesis is cemented onto the abutment
    - Offers better aesthetics but more challenging to remove
3. **Magnetic Retained Implants**
    - Uses magnets to secure the prosthesis
    - Simplifies attachment and removal of dentures

Based on Implant Materials

Dental implants are made from a variety of materials, each offering unique advantages. Titanium and its alloys are the most commonly used due to their strength and biocompatibility. Zirconia and other ceramic materials are favored for their aesthetic benefits and suitability for patients with metal allergies. Composite materials like CFR-PEEK and HA-PEEK provide alternatives with specific benefits, such as being radiolucent and lightweight. Emerging materials like tantalum, magnesium, and bioactive glass are being explored for their potential to enhance osseointegration and bone regeneration.

Titanium Implants

1. **Commercially Pure Titanium (cpTi)**
    - High biocompatibility
    - Different grades (Grade 1 to Grade 4) based on oxygen and iron content
    - Grade 4 is the strongest and most commonly used
2. **Titanium Alloy (Ti-6Al-4V)**
    - Alloy of titanium with aluminum and vanadium
    - Higher strength compared to commercially pure titanium
    - Widely used due to its balance of strength and biocompatibility

Zirconia Implants

1. **Monolithic Zirconia**
    - Made from a single piece of zirconia
    - Metal-free, highly biocompatible, and aesthetically pleasing
    - Strong and suitable for patients with metal allergies
2. **Zirconia-Toughened Alumina (ZTA)**
    - Composite material combining zirconia and alumina
    - Improved fracture toughness and mechanical properties

Ceramic Implants

1. **Alumina (Aluminum Oxide) Implants**
    - High biocompatibility and aesthetic appeal
    - Less commonly used due to brittleness compared to zirconia
2. **Glass-Ceramic Implants**
    - Incorporates biocompatible glass-ceramic materials
    - Can bond with bone and promote osseointegration

Composite Implants

1. **Carbon Fiber-Reinforced PEEK (CFR-PEEK)**
    - Combines polyether ether ketone (PEEK) with carbon fibers
    - Lightweight, radiolucent, and high strength
    - Good alternative for patients with metal allergies
2. **HA-PEEK (Hydroxyapatite-Coated PEEK)**
    - PEEK implants coated with hydroxyapatite
    - Enhances osseointegration and bone bonding

Novel and Emerging Materials

1. **Tantalum Implants**
    - High biocompatibility and corrosion resistance
    - Porous structure promotes bone in-growth
2. **Magnesium Implants**
    - Biodegradable material
    - Promotes natural bone regeneration as it gradually resorbs
3. **Bioactive Glass Implants**
    - Composed of silica, calcium oxide, and phosphorus oxide
    - Supports bone growth and healing

17. Dental Implant Treatment in Geriatric Patients

အသက်အရွယ်ကြောင့် medically compromised diseases တွေ ရှိနေနိုင်ပေမယ့် အထူးကြပ်မတ်ပြီး ကုသမှုပေးနိုင်ပါတယ်။ ဆေးပညာတိုးတက်လာနဲ့အမျှ လူတွေအသက်ပိုရှည်လာကြပြီး အသက်ကြီးသူတွေ များလာတာနဲ့အမျှ သွားမြစ်တုကုသမှုတွေကို ပိုလုပ်လာကြလိမ့်မယ်လို့ ခန့်မှန်းထားကြပါတယ်။

Surgical Complications

1. **Intraoperative Bleeding**
    - Increased risk due to potential use of anticoagulant medications
    - Requires careful management and possibly medical consultation
2. **Nerve Injury**
    - More challenging anatomy due to age-related bone resorption
    - Precise imaging and surgical planning are essential to avoid nerve damage
3. **Delayed Healing**
    - Age-related reduction in regenerative capacity
    - Longer recovery periods and potential for prolonged discomfort

Osseointegration Issues

1. **Poor Bone Quality**
    - Reduced bone density and volume in elderly patients
    - Higher risk of implant instability and failure
2. **Bone Graft Complications**
    - Increased need for bone grafting procedures
    - Potential for graft failure or infection

Systemic Health-Related Complications

1. **Infection**
    - Compromised immune response in older adults
    - Increased susceptibility to postoperative infections
2. **Medication Interactions**
    - Impact of medications on bone metabolism and healing (e.g., bisphosphonates)
    - Potential interactions with antibiotics or pain medications used postoperatively
3. **Chronic Disease Management**
    - Complications related to underlying conditions like diabetes or cardiovascular diseases
    - Need for coordinated care with medical professionals

Prosthetic Complications

1. **Prosthesis Fit and Comfort**
    - Difficulty achieving optimal fit due to changes in oral anatomy
    - Higher risk of discomfort and poor function
2. **Maintenance Challenges**
    - Challenges in maintaining oral hygiene due to dexterity issues

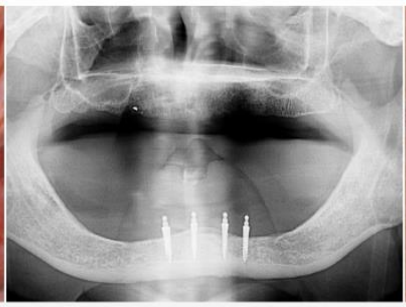
- Increased risk of peri-implantitis and implant failure

Psychosocial Factors

1. **Compliance Issues**
   - Difficulty adhering to postoperative care and follow-up schedules
   - Importance of support and education to ensure compliance
2. **Expectation Management**
   - Unrealistic expectations about outcomes
   - Necessity of clear communication and managing expectations

Patient Assessment Checklist Example	
What is the patient's age?	
What medications and supplements do they take?	
What comorbidities do they have? (Obtain medical records if necessary.)	
Can the patient communicate effectively?	
Does the patient use a cane, walker or wheelchair?	
Does the patient have difficulty seeing or hearing?	
Does a caregiver or family member need to be present? (Obtain their contact information and a signed consent form to communicate with them about the patient.)	
Will the patient need appointments scheduled at a certain time of day?	
What do your staff members need to know about this patient to efficiently do their job?	
Will the patient need more frequent follow-up visits?	

Posterior clinical view of four small-diameter Inclusive Mini Implants placed immediately through a surgical guide.



Panoramic radiograph of four small-diameter Inclusive Mini Implants in place in the mandible.

Small-diameter implant placement and lower denture stabilization can typically be completed in the same appointment, giving the patient a functional appliance on the day of surgery.

18. Choice of Bone Grafts and Barrier Membranes

သွားမြစ်တုထည့်မယ့်နေရာမှာ အရိုးပမာဏနည်းနေရင် bone graft ထည့်ရလေ့ရှိပါတယ်။ ဘယ်လို bone graft က မိမိလူနာအတွက်၊ မိမိထည့်မယ့်နေရာအတွက် သင့်တော်သလဲဆိုတာကို သိထားဖို့ လိုအပ်ပါတယ်။ ဒါ့အပြင် bone graft ထည့်တာနဲ့ အင်ပလန့်ထည့်တာကို visit တစ်ခုတည်းမှာလုပ်မလား၊ bone graft ကို အရင်ထည့်ထားပြီး အချိန်တစ်ခုကြာမှ အင်ပလန့်ကို ထည့်မလားဆိုတာ စဉ်းစားရမှာ ဖြစ်ပါတယ်။ bone graft အမျိုးအစားတွေ၊ သူတို့ရဲ့ properties တွေ၊ အထူးသဖြင့် resorption ဖြစ်လာနိုင်တဲ့ အနေအထားတွေကို သိရှိထားခြင်းဖြင့် လိုအပ်သလို ထိထိရောက်ရောက် အသုံးပြုနိုင်ပါလိမ့်မယ်။ Bone graft ထည့်လိုက်ပေမယ့် မထည့်သင့်တဲ့အမျိုးအစားကို ရွေးချယ်အသုံးပြုမိခဲ့ရင် နောက်ဆက်တွဲကုသမှုတွေကို ထပ်မံလုပ်ဆောင်ရတတ်ပါတယ်။

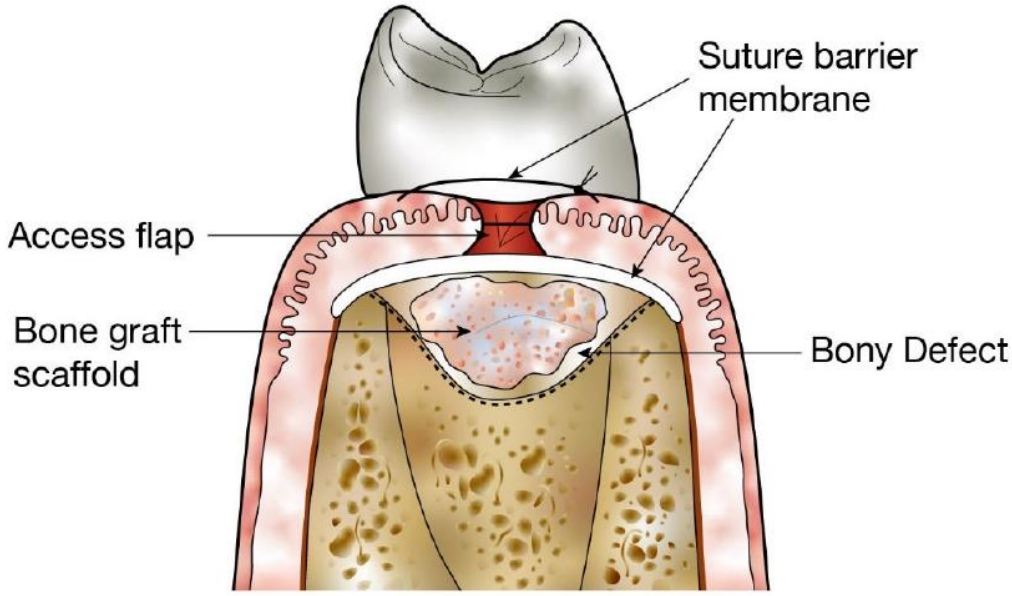


Figure 1. Use of structural scaffolds to restore bony defects. Diagram shows placement of a bone graft scaffold within a bony defect in alveolar bone following surgical generation of an access flap.

Purpose of Bone Grafts

- Bone grafts are used to augment deficient alveolar ridges to provide adequate bone volume and density for implant placement.

Types of Bone Grafts

1. **Autografts**
    - **Source:** Patient's own bone, often harvested from the chin, ramus, or iliac crest.
    - **Advantages:** Excellent biocompatibility, no risk of immune rejection, osteogenic potential.
    - **Disadvantages:** Requires a second surgical site, potential for donor site morbidity.
2. **Allografts**

    - **Source:** Cadaver bone, processed to ensure safety and sterility.
    - **Advantages:** No second surgical site, readily available, good osteoconductive properties.
    - **Disadvantages:** Potential for immune response, variable integration rates.
3. **Xenografts**
    - **Source:** Bone from other species (commonly bovine).
    - **Advantages:** Readily available, good osteoconductive scaffold.
    - **Disadvantages:** Slower resorption rates, potential for immune reaction.
4. **Alloplasts**
    - **Source:** Synthetic materials (e.g., hydroxyapatite, tricalcium phosphate).
    - **Advantages:** No risk of disease transmission, customizable resorption rates.
    - **Disadvantages:** Lack of osteogenic properties, varying degrees of integration.

Factors Influencing Graft Choice

1. **Defect Size and Location**
    - Larger defects may require autografts or allografts for sufficient volume and stability.
    - Smaller defects may be adequately treated with xenografts or alloplasts.
2. **Patient Factors**
    - Health status, systemic conditions, and preferences can influence the choice of graft material.
    - Patients with compromised healing may benefit from materials with enhanced osteogenic potential.
3. **Surgical Considerations**
    - Complexity of the procedure, available surgical expertise, and potential for complications must be considered.
    - Minimally invasive techniques may favor alloplasts or xenografts.
4. **Economic Factors**
    - Cost of graft materials and insurance coverage can impact the decision.
    - Autografts may be less expensive but involve additional surgical costs.

Clinical Outcomes

- Successful bone grafting leads to improved implant stability and longevity.
- Long-term success depends on proper material selection, surgical technique, and post-operative care.

Specific Indications by Procedure

1. **Sinus Lift:**
    - Preferred grafts: Allografts, Xenografts.
    - Examples: Bio-Oss®, Puros®.
2. **Ridge Augmentation:**
    - Preferred grafts: Autografts, Allografts, Xenografts.
    - Examples: MinerOss®, Bio-Oss®.
3. **Socket Preservation:**
    - Preferred grafts: Allografts, Xenografts, Alloplasts.
    - Examples: AlloDerm®, NuOss®, Novabone®.
4. **Periodontal Defects:**

- Preferred grafts: Allografts, Xenografts.
- Examples: AlloDerm®, OsteoBiol®.

5. **Large Defects:**
   - Preferred grafts: Autografts, Allografts.
   - Examples: Patient-derived bone, Puros®.

Choosing the Right Graft

- **Biocompatibility:** Ensuring the material is well-tolerated by the patient's body.
- **Volume Stability:** For long-term maintenance of bone volume.
- **Osteogenic Potential:** Higher for autografts, moderate for allografts, lower for xenografts and alloplasts.
- **Clinical Scenario:** Specific procedural needs and defect characteristics.

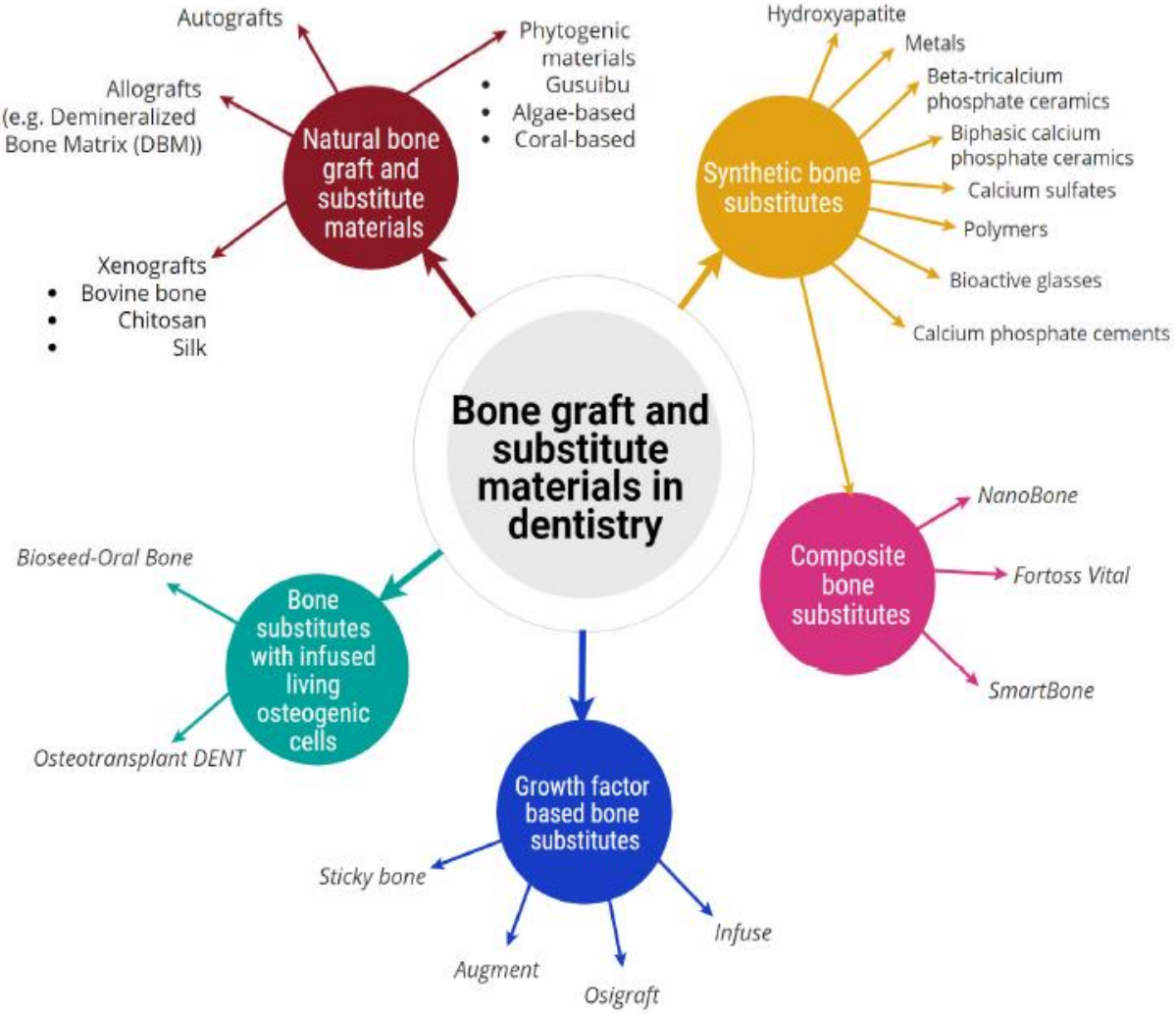


Figure 2. Classification of bone graft and substitute materials used in dentistry, broadly classified into five categories and showing their associated sub-categories.

Purpose of Barrier Membranes

- Barrier membranes are used in guided bone regeneration (GBR) and guided tissue regeneration (GTR) to prevent the invasion of non-osteogenic tissues into the bone defect site, allowing for proper bone regeneration.

Types of Barrier Membranes:

1. **Resorbable Membranes:**
    - **Materials:** Collagen, polylactic acid, polyglycolic acid.
    - **Commercial Products:** Bio-Gide®, BioMend®, Mem-Lok®.
    - **Indications:**
        - GBR in ridge augmentation.
        - Socket preservation.
        - Sinus lift procedures.
        - Periodontal defect regeneration.
2. **Non-Resorbable Membranes:**
    - **Materials:** Expanded polytetrafluoroethylene (ePTFE), high-density polytetrafluoroethylene (dPTFE).
    - **Commercial Products:** Gore-Tex®, Cytoplast®.
    - **Indications:**
        - GBR in large defects.
        - Ridge augmentation requiring longer stabilization.
        - Sites with high potential for membrane exposure.

Indications and Specific Uses:

1. **Ridge Augmentation:**
    - **Membranes Used:** Bio-Gide®, Gore-Tex®.
    - **Purpose:** To maintain space for bone regeneration and prevent soft tissue infiltration.
2. **Socket Preservation:**
    - **Membranes Used:** BioMend®, Mem-Lok®.
    - **Purpose:** To support the preservation of alveolar ridge height and width following tooth extraction.
3. **Sinus Lift:**
    - **Membranes Used:** Bio-Gide®, Cytoplast®.
    - **Purpose:** To protect the sinus membrane and stabilize the bone graft material.
4. **Periodontal Defects:**
    - **Membranes Used:** BioMend®, Bio-Gide®.
    - **Purpose:** To facilitate the regeneration of periodontal tissues, including bone, periodontal ligament, and cementum.
5. **Large Defects:**
    - **Membranes Used:** Gore-Tex®, Cytoplast®.
    - **Purpose:** To provide long-term barrier function and structural support in extensive bone defects.

Choosing the Right Membrane:

- **Biocompatibility:** Ensuring the material is well-tolerated and integrates with the patient's tissues.
- **Resorption Time:** Matching the membrane resorption rate with the bone healing process.
- **Handling Properties:** Ease of use, flexibility, and adherence to defect sites.
- **Clinical Scenario:** Specific procedural needs, defect characteristics, and potential for membrane exposure.

19. Implant-Assisted vs. Implant-Supported

Implant Assisted Overdenture on 4 dental implants

Implant Supported Denture- Removable by the Patient for cleaning

Implant-Assisted Prostheses

- **Definition:** Prostheses that rely on both dental implants and the surrounding natural tissues (e.g., gums, remaining teeth) for support.
- **Characteristics**
  - Implants provide additional stability, but the load is shared with natural tissues.
  - Typically used in partial dentures or overdentures.
  - May be removable by the patient for cleaning.
- **Indications**
  - Patients with sufficient residual ridge support.
  - Partial edentulism where natural teeth are still present.
  - Cost-effective solution compared to full implant-supported options.
- **Examples**
  - Overdentures supported by 2-4 implants with soft tissue support.

Implant-Supported Prostheses

- **Definition:** Prostheses that rely entirely on dental implants for support, with no reliance on natural tissues.
- **Characteristics**
  - All masticatory forces are transmitted to the implants and underlying bone.
  - Typically used in fixed dental prostheses or full-arch restorations.
  - Provides maximum stability and function.
- **Indications**
  - Full edentulism (complete tooth loss).
  - Cases where natural tissue support is inadequate or absent.
  - Higher initial cost but superior long-term stability.
- **Examples**

- Full-arch fixed implant bridges.
- All-on-4 or All-on-6 implant-supported dentures.

Key Differences

1. **Support Mechanism**
   - Implant-Assisted: Shared support between implants and natural tissues.
   - Implant-Supported: Exclusive support from implants.
2. **Indications**
   - Implant-Assisted: Suitable for partial edentulism and cases with adequate natural tissue support.
   - Implant-Supported: Preferred for complete edentulism and insufficient natural tissue support.
3. **Maintenance**
   - Implant-Assisted: Removable for easier cleaning.
   - Implant-Supported: Often fixed and more challenging to clean, requiring regular professional maintenance.
4. **Cost**
   - Implant-Assisted: Generally lower initial cost.
   - Implant-Supported: Higher initial investment but potentially better long-term value.

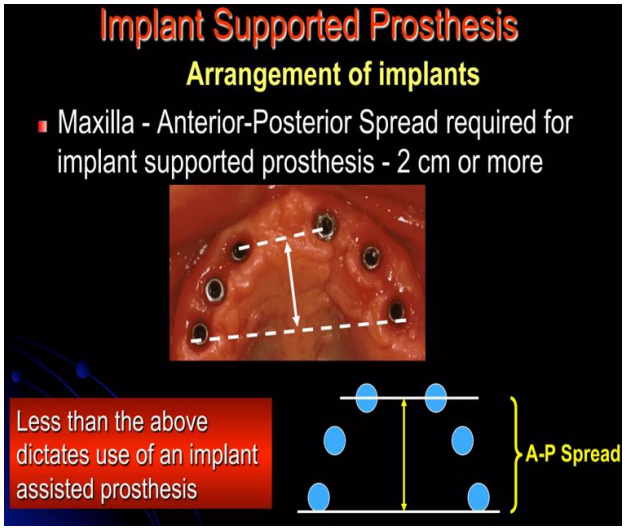
ALL ON 4 CONCEPT ADVANTAGES

- Elimination of bone grafting procedures:

1. Shorter treatment plan,
2. Less patient morbidity,
3. Decreased cost,
4. Immediate restoration.

- Increase in A-P spread → more stable prosthesis.
- Elimination or shortening of cantilevers.
- Avoidance of various anatomic structures.
- Fewer implants to support the prosthesis.

Maxillary All on Four Therapy using Angled Implants, Dent Clin N Am 55(2011) 779-794



Implant Supported Hybrid Denture – Removable by a dentist but not the patient

20. Risk Factors and Contraindications

သွားမြစ်တုကုသမှုမပြုလုပ်ခင်မှာ လူနာဟာ သွားမြစ်တုကုသမှုနဲ့ အဆင်ပြေနိုင်လား၊ မပြေနိုင်ဘူးလား ဆိုတာကို သိနိုင်ဖို့ အောက်မှာဖေါ်ပြထားတဲ့ risk factors and contraindications တွေကို လေ့လာကြည့်ပါ။

Risk Factors and Complications

1. **Patient-Related Risk Factors**:
    - **Systemic Conditions**: Diabetes, osteoporosis, and cardiovascular diseases can affect healing and integration.
    - **Smoking**: Increases the risk of implant failure and peri-implantitis.
    - **Poor Oral Hygiene**: Leads to plaque buildup and peri-implant diseases.
    - **Bruxism**: Excessive forces can cause implant failure.
2. **Surgical Risk Factors**:
    - **Inadequate Bone Quantity/Quality**: Insufficient bone may not support the implant properly.
    - **Poor Surgical Technique**: Inaccurate placement can lead to mechanical and biological complications.
    - **Infection**: Lack of aseptic techniques can result in peri-implant infections.
    - **Immediate Loading**: Premature loading of the implant can hinder osseointegration.
3. **Implant-Related Risk Factors**:
    - **Design and Surface**: Improper design or surface treatment may impair osseointegration.
    - **Material**: Non-biocompatible materials can lead to adverse reactions.
4. **Prosthetic Risk Factors**:
    - **Improper Prosthetic Design**: Can cause undue stress on the implant and surrounding tissues.
    - **Poor Occlusal Adjustment**: Misalignment can lead to mechanical overload.
5. **Complications**:
    - **Early Complications**:
        - **Infection**: Occurs due to contamination during or after surgery.
        - **Implant Mobility**: Indicates failure of initial stability and potential failure.
    - **Late Complications**:
        - **Peri-Implantitis**: Inflammation and bone loss around the implant.
        - **Mechanical Complications**: Fracture of the implant or prosthetic components.
        - **Aesthetic Issues**: Poor positioning can result in unsatisfactory aesthetic outcomes.
6. **Management of Complications**:
    - **Infection Control**: Use of antibiotics, antiseptic mouth rinses, and debridement.
    - **Surgical Interventions**: Bone grafting, implant removal, and re-implantation if necessary.
    - **Maintenance Therapy**: Regular follow-ups and professional cleanings to prevent peri-implant diseases.

Table 1.3: Difference between Absolute and Relative Contraindication

Absolute Contra -Indication	Relative Contraindication
Recent myocardial infarction	Smoking
Recent cardiac valve prosthesis placement	Uncontrolled diabetes
Hemolytic diathesis	Uncontrolled hypothyroidism
Immunosuppression	Osteoporosis
Severe, uncontrolled psychiatric disorder	Poor oral hygiene
Intravenous bisphosphonate treatment	Oral bisphosphonates
Cancer radiation and chemotherapy	History of radiation therapy to the jaws

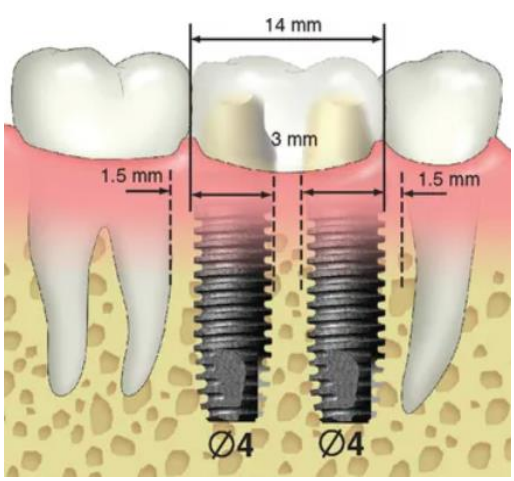
Table 4 Risk Factors in Implant Patients

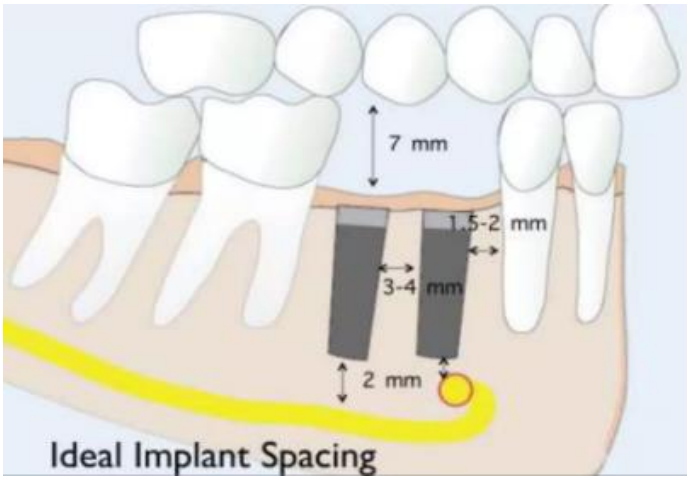
Risk factors	Remarks
Medical	Severe bone disease causing impaired bone healing Immunologic disease Medication with steroids Uncontrolled diabetes mellitus Irradiated bone Others
Periodontal	Active periodontal disease History of refractory periodontitis Genetic disposition
Smoking habits	Light smoking (< 10 cigarettes per d) Heavy smoking (≥ 10 cigarettes per d)
Oral hygiene/ compliance	Home care measured by gingival indices
Occlusion	Personality, intellectual aspects Bruxism

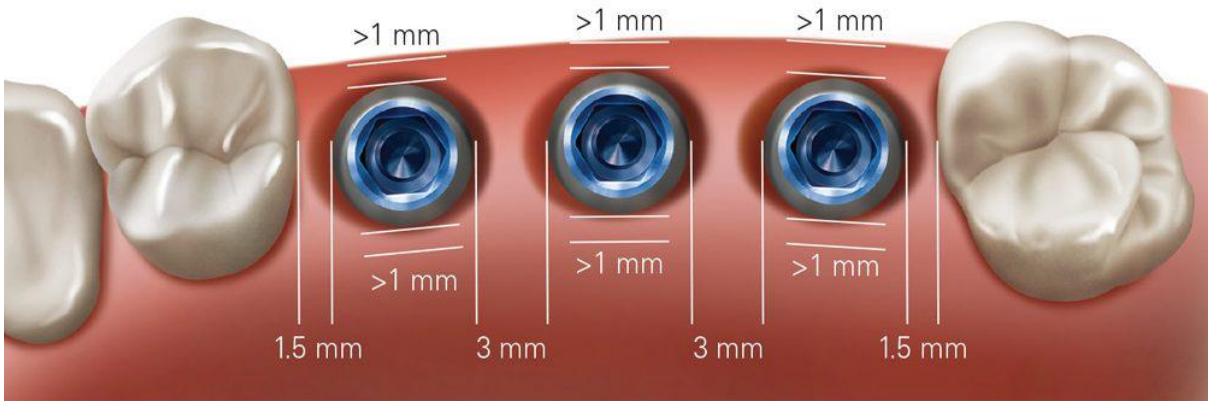
TABLE 1. Main Risks of Implant Complications

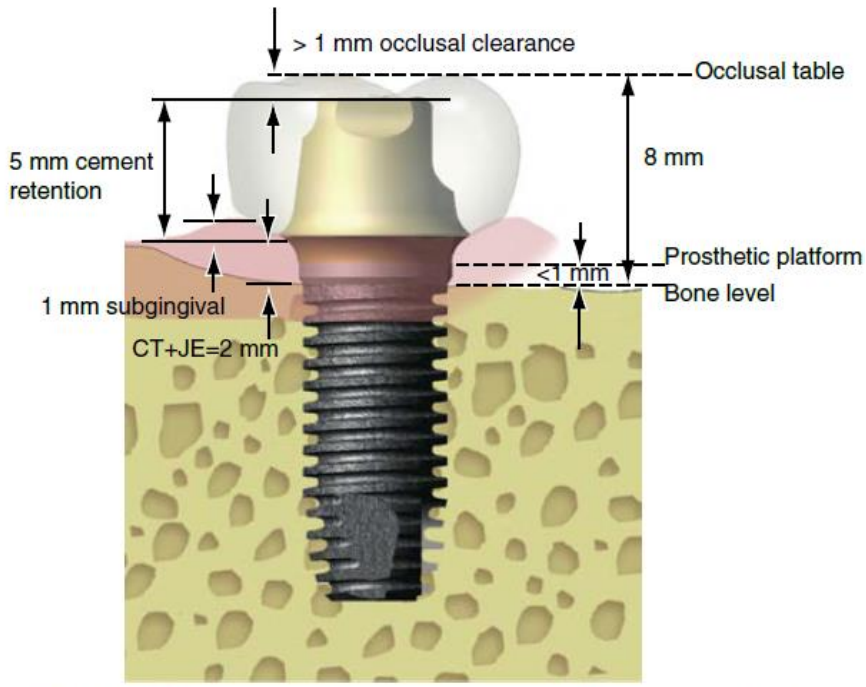
Systemic Factors	Local Factors
Smoking	Previous periodontal disease
Diabetes mellitus	Poor oral hygiene
Head and neck radiation	Residual cement
IL-1 β polymorphisim	Occlusal overload
Postmenopausal estrogen therapy	Amount of keratinized tissue
Antidepressant medication	Malpositioned implant
Compliance	Apical pathosis on adjacent tooth
	Poor prosthetic design

21. Ideal Implant Positioning









• **Fig. 8.23** The crown height space is measured from the occlusal plane to the crest of the bone.

Structure	Minimum required distance between implant and indicated structure
Buccal plate	0.5mm
• Lingual plate • Maxillary sinus • Nasal cavity • Inferior border	1mm
Adjacent natural tooth	1mm – 1.5mm
Inferior alveolar canal	2mm from superior aspect of bony canal
Inter implant distance	3mm between outer edge of implants
Mental nerve	5mm from anterior or bony foramen
Incisive canal	Avoid midline maxilla

Anatomical Limitations to Implant Placement

1. **Buccal Plate**:
   - Minimum Distance: 0.5 mm
2. **Lingual Plate**:
   - Minimum Distance: 1 mm
3. **Maxillary Sinus**:
   - Minimum Distance: 1 mm
4. **Nasal Cavity**:
   - Minimum Distance: 1 mm
5. **Incisive Canal**:
   - Avoid midline maxilla
6. **Interimplant Distance**:
   - Minimum Distance: 3 mm between outer edge of implants
7. **Inferior Alveolar Canal**:
   - Minimum Distance: 2 mm from the superior aspect of the bony canal
8. **Mental Nerve**:
   - Minimum Distance: 5 mm from the anterior or bony foramen
9. **Inferior Border**:
   - Minimum Distance: 2 mm
10. **Adjacent Natural Tooth**:
    - Minimum Distance: 0.5 mm

22. Success, Survival, Failure

TABLE 1. Criteria for Implant Success Suggested by Albrektsson et al, 1986[4]

1. Individual, unattached implant that is immobile when tested clinically
2. Radiography that does not demonstrate evidence of peri-implant radiolucency
3. Bone loss that is less than 0.2 mm annually after the implant's first year of service
4. No persistent pain, paresthesia, discomfort or infection
5. By these criteria, a success rate of 85% at the end of a 5-year observation period and 80% at the end of a 10-year period are minimum levels for success

TABLE 2 Implant Survival and Success Criteria according to Proskin and colleagues[11]

	Implant Survival	Implant Success
Implant in the mouth and functioning	X	X
No pain	X	X
No mobility (if it can be measured)	X	X
No infection	X	X
Less than 50% bone loss	Not reported	X

TABLE 1

Implant success according to Health Scale for Dental Implants

Implant Quality Scale Group and Criteria
I. Success (optimum health) (a) No pain or tenderness upon function (b) 0 mobility (c) <2 mm radiographic bone loss from initial surgery (d) No exudates history
II. Satisfactory survival (a) No pain on function (b) 0 mobility (c) 2–4 mm radiographic bone loss (d) No exudates history
III. Compromised survival (a) May have sensitivity on function (b) No mobility (c) Radiographic bone loss >4 mm (<1/2 of implant body) (d) Probing depth >7 mm (e) May have exudates history
IV. Failure (absolute or clinical failure) Any of the following: (a) Pain on function (b) Mobility (c) Radiographic bone loss >1/2 length of implant (d) Uncontrolled exudate (e) No longer in mouth

23. Alveolar Ridge Augmentation/Preservation Techniques

အောက်မှာဖော်ပြထားတဲ့ နည်းလမ်းတွေဟာ တစ်ချို့က အသုံးများပြီး တစ်ချို့က စမ်းသပ်ဆဲအဆင့်သာ ရှိပါသေးတယ်။ တစ်ချို့နည်းလမ်းတွေဟာ alveolar ridge augmentation/preservation လုပ်ရာမှာ တွဲဖက်အသုံးပြုလေ့ရှိတဲ့ နည်းလမ်းတွေ ဖြစ်ပါတယ်။ တစ်ချို့နည်းလမ်းတွေဟာ soft tissue ကို လိုအပ်သလို ထိန်းချုပ်ပြုပြင်ပြီး hard tissue တွေကို preservation/augmentation လုပ်ရာမှာ တစ်ဖက်တစ်လမ်းကနေ အထောက်အကူဖြစ်စေဖို့သာ ရည်ရွယ်ပါတယ်။ နည်းလမ်းပေါင်းစုံကို ဖတ်ဖူး၊ တွေ့ဖူး၊ ကြုံဖူး၊ လုပ်ဖူးခြင်းဖြင့် အရေးအကြောင်းကြုံလာတဲ့အခါ အသင့်တော်ဆုံးနည်းလမ်းကို ရွေးချယ်အသုံးပြုနိုင်မှာ ဖြစ်ပါတယ်။

အောက်မှာဖော်ပြထားတဲ့ နည်းလမ်းတွေကို ကြုံတွေ့ရတဲ့ ကေ့စ်အလိုက် လိုအပ်သလို ပေါင်းစပ်အသုံးပြုနိုင်ဖို့သာ ရည်ရွယ်ပါတယ်။ အချို့အပိုင်းတွေဟာ alveolar ridge preservation/augmentation လုပ်တဲ့ နည်းလမ်းတစ်ခုဆိုတာထက် preservation/augmentation လုပ်ရာမှာ အသုံးပြုတဲ့ နည်းလမ်းအပိုင်းအစလေးတွေ၊ တွဲဖက်အသုံးပြုနိုင်တဲ့ materials/ideas/strategies လေးတွေသာ ဖြစ်ပါတယ်။

1. **Bone Grafting**:
    - **Autografts**: Bone harvested from the patient's own body (e.g., iliac crest, mandible).
    - **Allografts**: Bone sourced from human donors.
    - **Xenografts**: Bone derived from animal sources.
    - **Alloplasts**: Synthetic bone substitutes.
2. **Guided Bone Regeneration (GBR)**:
    - Utilizes barrier membranes to protect the bone graft and allow bone regeneration.
    - Membranes can be resorbable (collagen) or non-resorbable (PTFE).
3. **Distraction Osteogenesis**:
    - Gradual mechanical stretching of the bone to stimulate new bone formation.
    - Involves surgical separation and gradual distraction of bone segments.
4. **Ridge Expansion**:
    - Mechanical widening of the alveolar ridge using specialized instruments.
    - Often combined with bone grafting to fill the expanded space.
5. **Socket Preservation**:
    - Grafting materials placed into the extraction socket immediately after tooth removal.
    - Aims to prevent ridge resorption and maintain bone volume.

6. **Sinus Lift (Sinus Augmentation)**:
    - Elevation of the sinus membrane and placement of bone graft material in the maxillary sinus area.
    - Used to increase bone height in the posterior maxilla for implant placement.
7. **Alveolar Ridge Splitting**:
    - Splitting the alveolar ridge longitudinally to create space for bone grafting.
    - Utilized in cases with narrow ridges to widen the bone for implant placement.
8. **Block Grafting**:
    - Harvesting a block of bone from another site (e.g., chin, ramus) and securing it to the deficient ridge.
    - Provides significant augmentation in cases of severe bone loss.
9. **Tenting Screw Technique**:
    - Placement of tenting screws to maintain space for bone grafting materials.

- Prevents collapse of the graft site and supports new bone formation.

10. **Use of Growth Factors and Biologics**:
    - Incorporation of growth factors (e.g., platelet-rich plasma, platelet-rich fibrin) to enhance healing and bone regeneration.
    - Biologic agents such as recombinant human bone morphogenetic proteins (rhBMP) can stimulate bone growth.
11. **Piezoelectric Surgery**:
    - Utilization of ultrasonic vibrations to cut bone precisely with minimal trauma to surrounding tissues.
    - Enhances bone grafting procedures and can be used for ridge splitting and expansion.

13. **Osseodensification**:
    - Utilizes specialized burs that densify the bone rather than removing it.
    - Enhances primary stability of implants and can aid in ridge expansion.
14. **Vertical Ridge Augmentation**:
    - Specifically targets vertical bone defects.
    - Techniques include the use of titanium mesh, distraction osteogenesis, and block grafts.
15. **Onlay Grafting**:
    - Involves placing a graft on top of the existing bone to increase its height or width.
    - Often used in combination with other techniques like guided bone regeneration.
16. **Miniscrews and Miniplates**:
    - Temporary anchorage devices that stabilize bone grafts and maintain space.
    - Help in the retention of graft material during healing.
17. **Combined Techniques**:
    - Utilization of multiple techniques in conjunction, such as GBR with sinus lift or ridge splitting with bone grafting.
    - Tailored to address complex cases and achieve optimal results.
18. **Laser-Assisted Ridge Augmentation**:
    - Use of lasers to enhance soft tissue management and bone regeneration.
    - Minimally invasive with reduced healing time and discomfort.
19. **Stem Cell Therapy**:
    - Application of stem cells to promote bone regeneration.
    - Still under research but shows promise in enhancing bone graft outcomes.
20. **Corticotomy-Assisted Ridge Augmentation**:
    - Involves making small cuts in the cortical bone to stimulate bone remodeling and growth.

- Can be combined with other grafting techniques for enhanced results.

21. **Autogenous Tooth Bone Grafting**:
    - Using extracted teeth that are processed and converted into bone graft material.
    - Provides a biocompatible grafting option with the patient's own biological material.
22. **Periosteal Releasing Incisions**:
    - Strategic incisions made in the periosteum to allow for better soft tissue coverage and tension-free closure over the grafted area.
    - Essential for maintaining the integrity of the graft and ensuring proper healing.
23. **Soft Tissue Augmentation**:
    - Enhancing the volume and quality of the soft tissue over the augmented ridge.
    - Techniques include connective tissue grafts, free gingival grafts, and use of soft tissue substitutes.
24. **Tunneling Technique**:
    - A minimally invasive method where graft material is placed through a small tunnel created in the soft tissue.
    - Reduces surgical trauma and improves patient comfort and recovery.
25. **Lip Repositioning**:
    - In cases of severe ridge resorption, repositioning of the lip can help manage the aesthetic concerns associated with ridge deficiencies.
    - Often used in conjunction with ridge augmentation techniques.
26. **Tissue Engineering Approaches**:
    - Combining scaffolds, cells, and signaling molecules to create bioengineered bone grafts.
    - This approach is still in experimental stages but has potential for future clinical applications.
27. **Titanium Mesh and Scaffolds**:
    - Use of custom-made titanium meshes or scaffolds to shape and support large or complex bone grafts.
    - Provides a stable framework for bone regeneration and maintains space for new bone growth.
28. **3D-Printed Grafts and Guides**:
    - Utilization of 3D printing technology to create customized bone grafts and surgical guides.
    - Enhances precision and outcomes in complex augmentation cases.
29. **Short Implants in Combination with Augmentation**:
    - Placement of short dental implants in conjunction with minor ridge augmentation to avoid extensive grafting.
    - Suitable for patients with limited bone height where extensive augmentation is not feasible.
30. **Use of Bone Morphogenetic Proteins (BMPs)**:
    - Application of BMPs to enhance and accelerate bone growth in grafting sites.
    - BMP-2 and BMP-7 are commonly used and can be combined with graft materials.
31. **Minimally Invasive Vertical Ridge Augmentation (MISVRA)**:
    - Focuses on vertical bone augmentation using minimally invasive surgical techniques.
    - Reduces patient morbidity and enhances healing.
32. **Orthodontic Extrusion**:

- Gradual extrusion of teeth to bring alveolar bone with them, increasing bone height in the process.
- Used in conjunction with grafting to maximize bone volume.

32. **Socket Shield Technique**:
    - Retaining a portion of the root (shield) of the extracted tooth to preserve the alveolar ridge.
    - Promotes bone and soft tissue preservation in the esthetic zone.

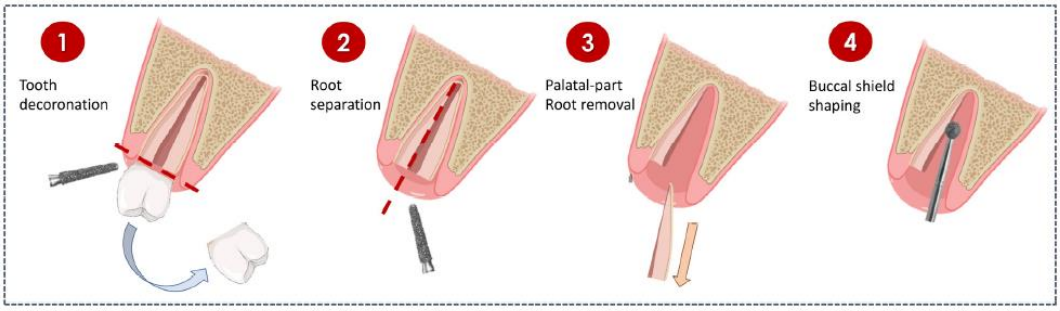


Figure 1. Surgical phases of the socket shield procedure. (Part 1) (1) Tooth decoronated with diamond bur. (2) Root division. (3) Removed palatal root. (4) Buccal shield shaping.

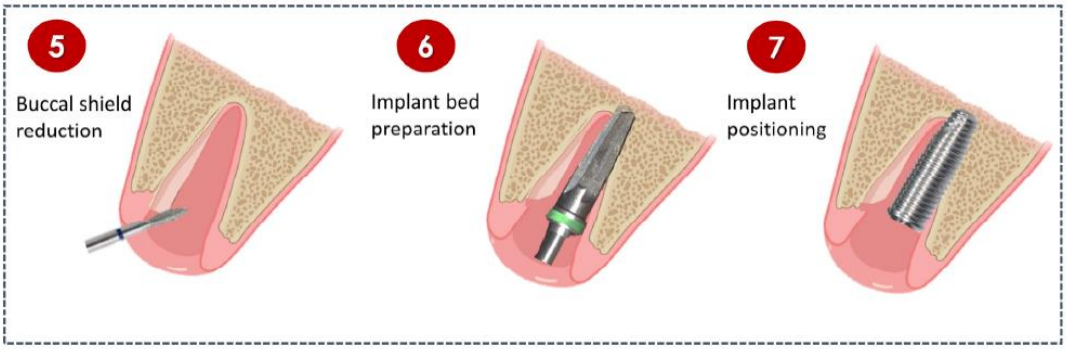


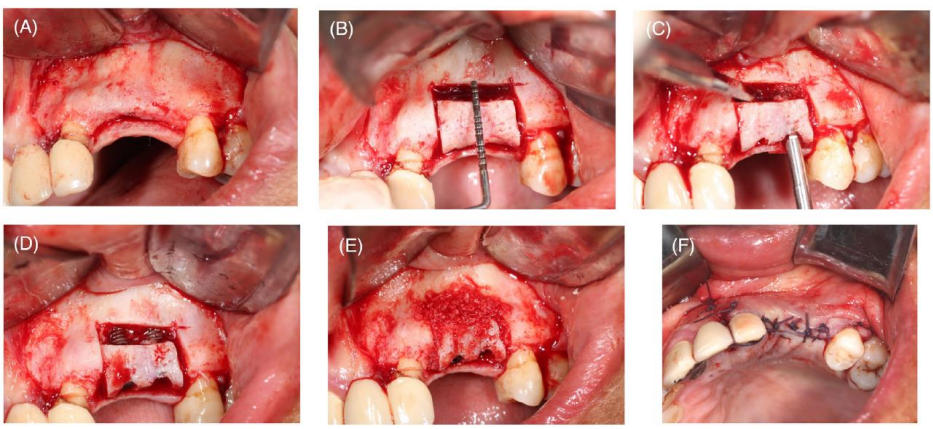
Figure 2. Surgical phases of the socket shield procedure. (Part 2). (5) Socket shield reduced to bone crest. (6) Implant bed preparation. (7) Implant placement.

33. **Alveolar Ridge Preservation (ARP)**:
    - Specific techniques focused on maintaining the ridge dimensions post-tooth extraction.
    - Includes immediate placement of grafting materials and the use of collagen plugs or membranes.
34. **L-PRF (Leukocyte-Platelet Rich Fibrin)**:
    - Utilizing L-PRF to promote soft tissue healing and bone regeneration.
    - Created from the patient's blood, enhancing biocompatibility and healing.
35. **Plasma Rich in Growth Factors (PRGF)**:
    - Similar to PRP, PRGF is used to enhance tissue regeneration.
    - Applied to grafting sites to promote faster and more effective healing.
36. **Decortication**:
    - Creating small perforations in the cortical bone to enhance blood supply and stimulate bone regeneration.
    - Often combined with other grafting techniques.
37. **Titanium-Reinforced Membranes**:

- Using membranes reinforced with titanium to provide additional stability to the graft site.
- Helps maintain space and shape during bone regeneration.

38. **Piezoelectric-Assisted Bone Splitting**:
    - Using piezoelectric devices to perform precise bone cuts with minimal trauma.
    - Enhances the safety and predictability of ridge splitting procedures.
39. **Implant Site Development**:
    - Incremental bone augmentation performed in stages, aligning with the implant placement phases.
    - Ensures optimal bone volume and quality for implant stability.
40. **Hydroxyapatite Coated Grafts**:
    - Use of hydroxyapatite-coated materials to enhance osteoconductivity.
    - Promotes better integration and faster bone healing.
41. **Bioglass and Bioactive Glass Grafts**:
    - Utilization of bioglass materials that bond with bone and promote regeneration.
    - Offers an alternative to traditional bone graft materials.
42. **Alveolar Ridge Horizontal Distraction Osteogenesis**:
    - Horizontal application of distraction osteogenesis to widen the alveolar ridge.
    - Useful for cases with significant horizontal deficiencies.
43. **Autogenous Graft Milling and Shaping**:
    - Custom milling and shaping of autogenous grafts for a precise fit.
    - Enhances the integration and stability of the graft.
44. **Cadaveric and Donor Bone Blocks**:
    - Use of cadaveric or donor bone blocks for significant ridge augmentation.
    - Provides a reliable source of graft material in large quantities.
45. **Immediate Implant Placement with GBR**:
    - Placing implants immediately after extraction combined with guided bone regeneration.
    - Minimizes treatment time and maintains alveolar dimensions.

46. **Periosteal Distraction Osteogenesis**:
    - Gradually stretching the periosteum (a layer of connective tissue covering the bone) to stimulate new bone formation beneath it.
    - Less invasive compared to traditional distraction osteogenesis.
47. **Segmental Osteotomy**:
    - Surgically cutting and moving a segment of the alveolar bone to a new position, often combined with bone grafting.
    - Useful for correcting severe ridge deficiencies and misalignments.



48. **Use of Orthobiologics**:
    - Application of biologically derived materials like stem cells, bone marrow aspirate concentrate (BMAC), and amniotic membrane products to enhance healing and bone regeneration.
49. **Polymer-Based Grafts**:
    - Utilizing biocompatible polymers as scaffolds for bone regeneration.
    - These can be used alone or in combination with other graft materials.
50. **Allogeneic Dentin Grafts**:
    - Using processed dentin from extracted teeth (from donors) as graft material.
    - Offers a novel approach with osteoinductive properties.
51. **Endoscopic Ridge Augmentation**:
    - Use of endoscopic techniques for minimally invasive ridge augmentation.
    - Allows for precise placement of graft materials with reduced surgical trauma.
52. **Biomimetic Scaffolds**:
    - Use of scaffolds designed to mimic the natural bone matrix, enhancing osteoconduction and integration.
    - Can be infused with growth factors or cells to promote regeneration.
53. **Use of Phycogenic (Algae-Derived) Bone Grafts**:
    - Algae-derived bone graft materials, such as those from red algae, are rich in calcium and support bone formation.
    - Provide a unique and sustainable grafting option.
54. **Synthetic Bone Substitutes with Drug Delivery Systems**:
    - Incorporation of drug delivery systems within synthetic bone grafts to release antibiotics, growth factors, or other therapeutic agents.
    - Enhances the healing process and reduces infection risks.
55. **Photobiomodulation Therapy (PBMT)**:
    - Application of low-level laser therapy to the graft site to stimulate bone regeneration and reduce inflammation.
    - Non-invasive and supports faster healing.
56. **Customized 3D-Printed Titanium Mesh**:
    - Custom-designed and 3D-printed titanium meshes tailored to the patient's specific anatomy.
    - Ensures optimal fit and support for large or complex grafts.
57. **Microsurgical Techniques for Flap Management**:
    - Advanced microsurgical techniques to enhance soft tissue management and coverage over graft sites.
    - Improves vascularization and healing.
58. **Zygomatic Implants Combined with Ridge Augmentation**:
    - Using long zygomatic implants in conjunction with alveolar ridge augmentation for patients with severe maxillary atrophy.
    - Provides a stable foundation when conventional implants are not feasible.
59. **Peri-Implant Augmentation**:
    - Augmentation of bone around existing implants that are at risk due to bone loss.
    - Techniques include grafting and guided bone regeneration to stabilize and preserve implants.
60. **Synthetic Bone Putty and Pastes**:
    - Injectable or moldable synthetic bone graft materials that can be precisely placed and shaped.
    - Offer ease of use and good handling properties.

61. **Distraction Osteogenesis with External Devices**:
    - Use of external distractors to gradually separate bone segments and encourage new bone formation.
    - Allows for controlled and predictable augmentation.
62. **RhBMP-2 Collagen Sponge**:
    - Use of recombinant human bone morphogenetic protein-2 (rhBMP-2) embedded in a collagen sponge.
    - Promotes bone growth and can be used in ridge augmentation procedures.
63. **Dentoalveolar Distraction Osteogenesis**:
    - A variation of distraction osteogenesis where the alveolar segment with teeth is moved.
    - Useful for correcting alveolar deficiencies while preserving natural dentition.
64. **Piezoelectric Bone Surgery for Ridge Splitting**:
    - Using piezoelectric tools to perform precise ridge splitting with minimal trauma.
    - Enhances safety and reduces complications.
65. **Bio-Oss® (Deproteinized Bovine Bone Mineral)**:
    - A widely used xenograft material derived from bovine bone.
    - Provides a natural scaffold for bone regeneration.
66. **Tissue Engineering with Stem Cells**:
    - Incorporating mesenchymal stem cells (MSCs) into graft materials to enhance bone regeneration.
    - Promotes faster and more robust bone formation.
67. **Alveolar Ridge Augmentation with Orthodontic Implants**:
    - Temporary anchorage devices (TADs) used to facilitate bone growth through orthodontic movements.
    - Helps to manipulate the bone structure in preparation for permanent implants.
68. **Subperiosteal Implants with Augmentation**:
    - Placing subperiosteal implants in cases with severe bone loss and augmenting the ridge to support these implants.
    - Provides an alternative for patients unsuitable for traditional implants.
69. **Hyaluronic Acid-Based Grafts**:
    - Using hyaluronic acid-based materials to support soft tissue and bone regeneration.
    - Enhances wound healing and tissue integration.
70. **Immediate Provisionalization with Augmentation**:
    - Placing a temporary prosthesis immediately after ridge augmentation and implant placement.
    - Ensures aesthetics and function during the healing phase.
71. **Osteoinductive and Osteoconductive Grafts**:
    - Combining materials that promote bone growth (osteoinductive) and materials that support new bone formation (osteoconductive).
    - Provides a synergistic effect for bone regeneration.
72. **Implant-Supported Ridge Augmentation**:
    - Using existing implants as support structures for additional bone grafting.
    - Helps stabilize the graft material and enhance integration.
73. **Synthetic Calcium Phosphate Cements**:
    - Injectable cements that harden into bone-like structures.
    - Used for filling bone defects and augmenting the ridge.
74. **Scaffold-Guided Bone Regeneration**:

- Utilizing 3D-printed or custom-shaped scaffolds to guide new bone growth.
- Provides a framework for bone regeneration in complex cases.

75. **Resorbable Synthetic Polymers**:
    - Using resorbable polymer materials as grafting materials or scaffolds.
    - Gradually replaced by natural bone over time.
76. **Ultrasound-Assisted Bone Regeneration**:
    - Application of low-intensity pulsed ultrasound to stimulate bone growth.
    - Non-invasive and enhances the healing process.
77. **Vertical and Horizontal Ridge Augmentation with Customized Blocks**:
    - Custom-shaped bone blocks tailored to the specific needs of vertical and horizontal deficiencies.
    - Provides precise augmentation and better integration.
78. **Combination of Autografts and Alloplasts**:
    - Blending autogenous bone with synthetic materials to optimize grafting outcomes.
    - Balances biocompatibility with structural support.
79. **Implant-Supported Overdentures with Ridge Augmentation**:
    - Augmenting the ridge to support implant-retained overdentures.
    - Ensures stability and improves function for removable prosthetics.
80. **Customized Allogeneic Bone Blocks**:
    - Using pre-shaped allogeneic bone blocks for ridge augmentation.
    - Reduces surgical time and enhances fit and integration.

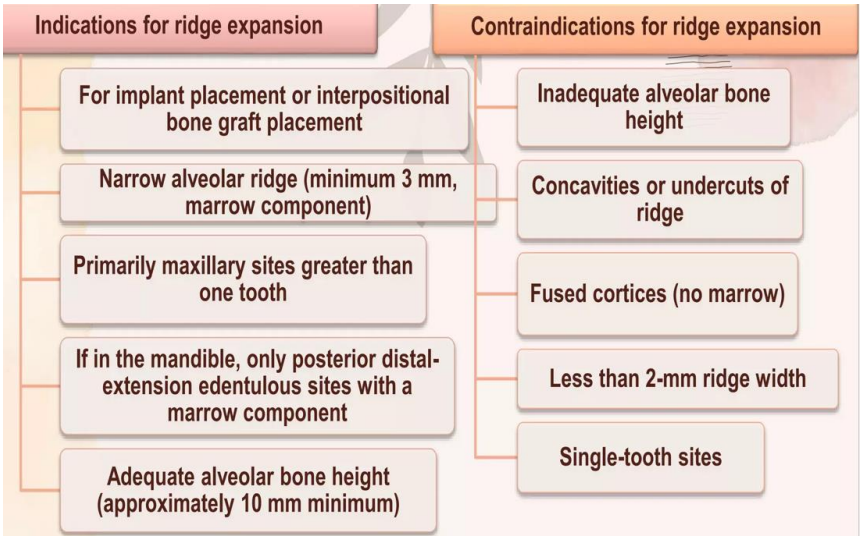


Table 1: Uses of piezosurgery in implant dentistry

• Bone grafting procedures	• Surgically assisted rapid maxillary expansion (SARME)
• Bone harvesting (chips)	• Implant site preparation
• Distraction osteogenesis	• Relocation of a malpositioned implant
• Ridge expansion	• Nerve transpositions
• Sinus lifts	• Atraumatic tooth extraction
• Le Fort I osteotomies	• Peri-mucositis/peri-implantitis and calculus removal

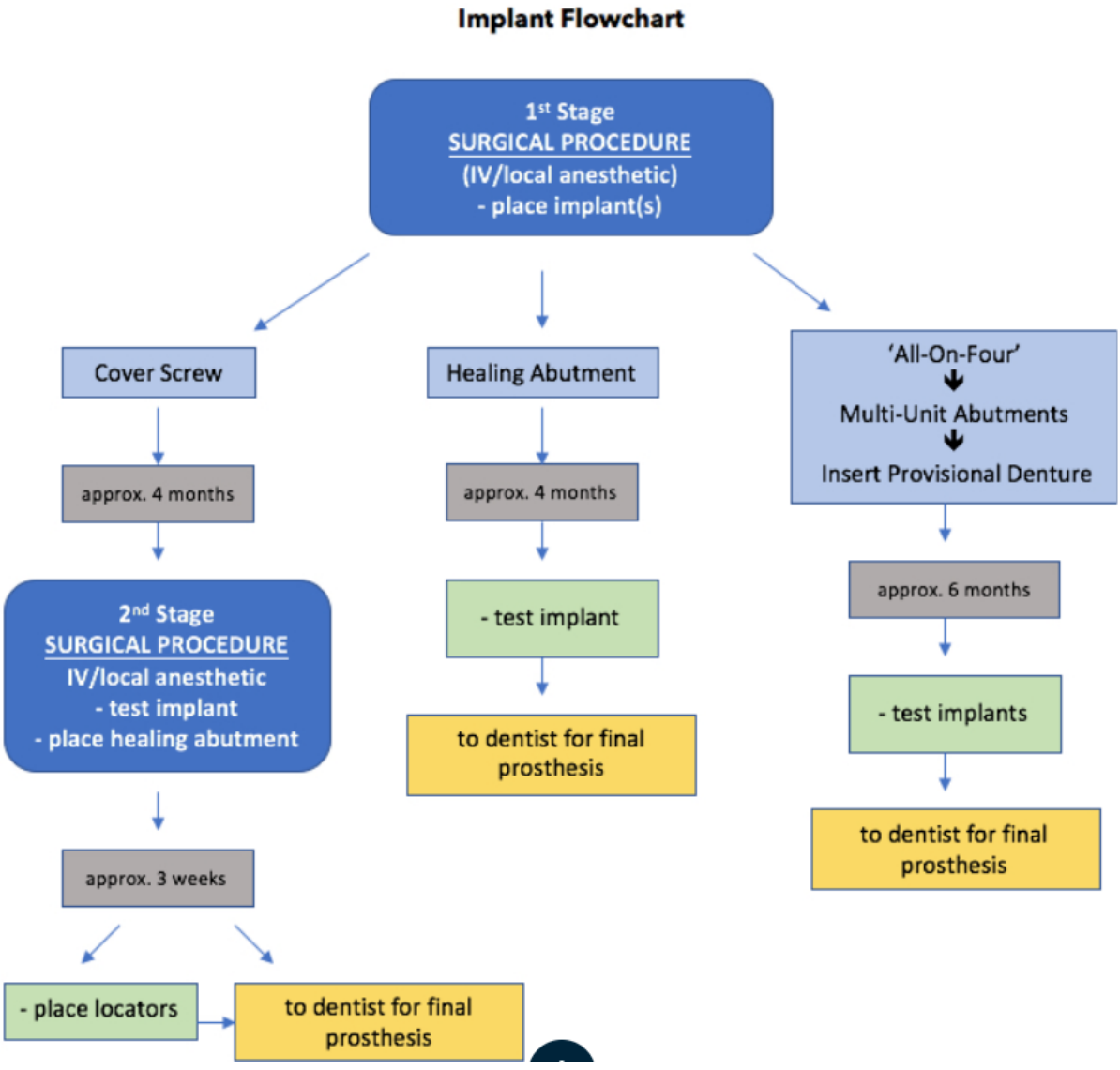
Procedure Comparison for the Posterior Mandible

Procedure	Vertical Augmentation Limits	Main Advantage	Main Disadvantage
Nerve repositioning	0 – implant length can be long because of the ability to engage the inferior border	Stable bone for long implant	High neurosensory disturbance, long crown- implant ratio for prosthesis
Onlay grafting	7 mm - 10 mm	Simple access, ease of fixation, donor source mandible, cranium, hip	Incision breakdown results in graft loss, significant graft resorption
Particulate bone with membrane	5 mm - 8 mm	Minimal morbidity, small or no donor site needed	Technically difficult, long time from graft to implant (9 months)
Distraction osteogenesis	5mm - 10 mm	Genesis of soft tissue, excellent bone augmentation	Long time from start of distraction to implants, may need additional grafting, patient morbidity from distraction device
Interpositional ostetotomy	4mm - 8 mm	One stage procedure, graft can be allograft, no donor site morbidity	May be technically difficult, limitation of augmentation height limited to soft-tissue stretch

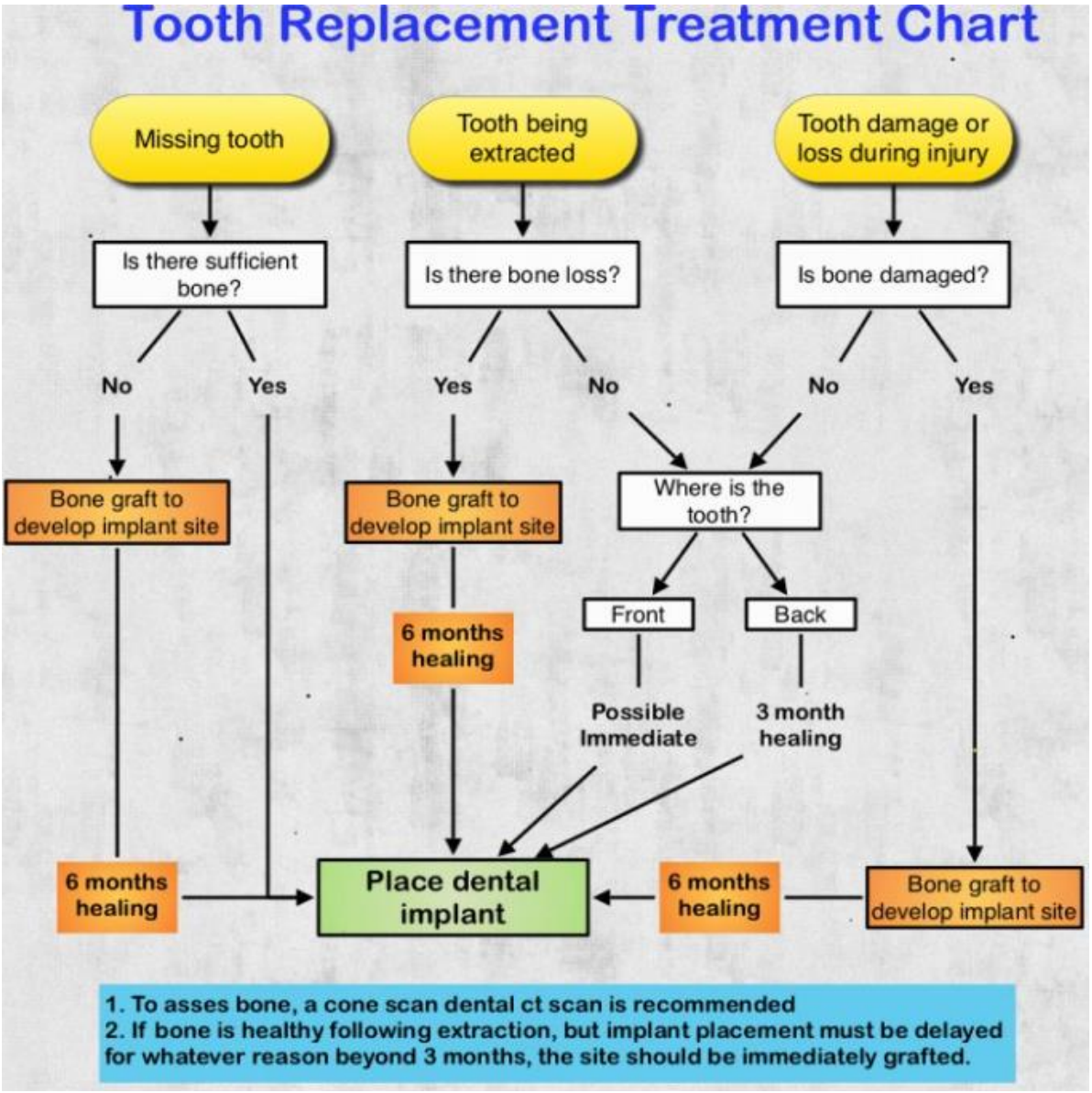
24. Treatment Stages

သွားနှုတ်ပီးရင်၊ bone graft ထည့်ပီးရင် သွားမြစ်တုကို ဘယ်အချိန်မှာ ထည့်လို့ရမလဲလို့ မေးလေ့ရှိကြပါတယ်။ ထည့်တဲ့အခါ surgical procedure ကို 1 stage တည်းနဲ့ ထည့်မလား၊ 2 stages နဲ့ ထည့်မလားလို့ သိလိုကြပါတယ်။ နောက်ဆုံးမှာ သွားတုကို ဘယ်အချိန်မှာ loading လုပ်သင့်သလဲဆိုပီး ဆွေးနွေးကြပါတယ်။ အထက်က မေးခွန်းတွေအတွက် တိတိကျကျ သတ်မှတ်ချက်တွေကို အားကိုးနေလို့ မရပါဘူး။ ကုသမှုပြုလုပ်နေစဉ် hard and soft tissues အခြေအနေတွေအပေါ် မူတည်ပြီး လိုအပ်သလို ကုသမှုပေးရမှာဖြစ်ပါတယ်။

ကုသမှုမပြုလုပ်ခင်က ဒီအဆင့်မှာ ဒါတွေလုပ်မယ်၊ ဒါပီးရင် ဘာတွေလုပ်မယ် စသဖြင့် ကြိုတင်ပြင်ဆင်ပြီး စိတ်ကူးထားလို့ ရပေမယ့် လက်တွေ့လုပ်တဲ့အခါ မမျှော်လင့်ဘဲ လိုအပ်ချက်တွေ၊ အားနည်းချက်တွေ၊ အခက်အခဲတွေ တွေ့လာနိုင်ပါတယ်။ ကုသမှုမလုပ်ခင်က အရိုးအခြေအနေကောင်းတယ်ထင်လို့ 1 stage surgery နဲ့ပဲ ပြီးအောင်လုပ်မယ်လို့ စိတ်ကူးထားပေမယ့် လက်တွေ့မှာ bone healing and osseointegration, stability တွေကောင်းအောင် 2 stage surgery လုပ်ဖို့ အစီအစဉ် ပြောင်းလိုက်ရတတ်ပါတယ်။



သွားမြစ်တုနဲ့ bone graft ထည့်တာကို တစ်ပြိုင်နက်လုပ်လို့ရတဲ့အခြေအနေတွေ ရှိသလို၊ bone graft ထည့်ထားပြီး နောက်ထပ် (၆-၉)လခန့်ကြာမှ သွားမြစ်တုကို ထည့်သင့်တဲ့အခြေအနေတွေလည်း ရှိနိုင်ပါတယ်။ bone graft ထည့်စဉ်က ကုသမှုအခြေအနေပေါ် မူတည်ပါတယ်။ လူနာရဲ့ သဘာဝအရိုးနဲ့ အစားထိုးထည့်ထားတဲ့ အရိုးတုတို့ ပေါင်းစပ်သွားမယ့်အချိန်ဟာ လူနာတစ်ဦးနဲ့တစ်ဦးချင်းစီမှာ ကွာခြားနိုင်ပါတယ်။

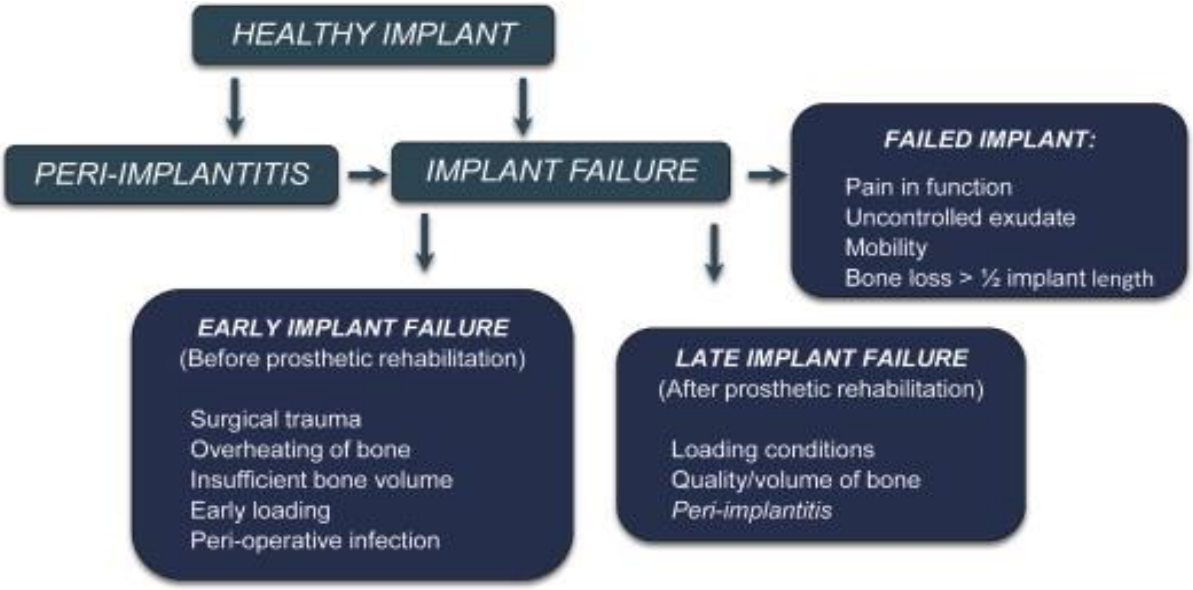


ကုသမှုပေးနေစဉ်မှာ လိုအပ်တဲ့ပစ္စည်းတွေ ပြည့်ပြည့်စုံစုံ ရှိနေသင့်ပါတယ်။ လူနာကို လက်တွေ့ကုသနေစဉ်မှာ bone graft, barrier membrane, suitable implant fixture size, healing abutment စတာတွေကို အပိုဆောင်ထားသင့်ပါတယ်။ မကုသခင်က စိတ်ကူးထားသလို ဖြစ်မလာခဲ့ရင် အပိုဆောင်ထားတဲ့အထဲက ယူသုံးရမှာ ဖြစ်ပါတယ်။ ဖြစ်တတ်တဲ့ အခြေအနေအရပ်ရပ်ကို မကုသခင်ကတည်းက လူနာကို ပြည့်ပြည့်စုံစုံ ရှင်းပြပေးထားခဲ့ရင် treatment visit အကြိမ်အရေအတွက် ပိုများသွားတာ၊ surgery အကြိမ်အရေအတွက် ပိုများသွားတာ၊ အချိန်ပိုကြာသွားတာ၊ ကုန်ကျစရိတ်ပိုများသွားတာတွေအတွက် ပြဿနာမဖြစ်နိုင်တော့ပါဘူး။

25. Reasons for Dental Implant Failure

သွားမြစ်တုကုသမှုပြုလုပ်တဲ့အခါ failure မဖြစ်အောင် ကုသမှုမလုပ်ခင်မှာ case selection သေချာလုပ်သင့်ပါတယ်။ Surgical techniques နဲ့ Prosthetic techniques တွေကို တိတိကျကျ မှန်မှန်ကန်ကန် ရွေးချယ်အသုံးပြုနိုင်ဖို့ လိုအပ်ပါတယ်။ သွားမြစ်တုထည့်ပြီးနောက် Regular follow-up and proper maintenance လုပ်ဖို့ အရေးကြီးပါတယ်။ သွားမြစ်တုထည့်ပြီးတဲ့အချိန်မှာ အောင်မြင်မှုရရှိခဲ့ရင်တောင် လူနာဘက်က လိုက်နာရမယ့်အချက်တွေ၊ ထိန်းသိမ်းရမယ့်အချက်တွေ၊ ဆောင်ရန်-ရှောင်ရန်အချက်တွေကို မလိုက်နာခဲ့ရင် failure ရနိုင်ပါသေးတယ်။ သွားသန့်ရှင်းလုပ်တာ အားနည်းခြင်း၊ ဆေးလိပ်အသောက်များခြင်း၊ medically compromised အခြေအနေရှိနေခြင်း၊ parafunctional habits ရှိခြင်းတို့ကြောင့် သွားမြစ်တုကုသမှုကို အနည်းနဲ့အများ ထိခိုက်စေနိုင်တာမို့ အဲ့ဒီလူနာတွေကို မကြာခဏ ပြန်လည်စစ်ဆေးပြီး လိုအပ်သလို ကုသမှုပေးသင့်ပါတယ်။

လူနာတွေ သဘောကျအောင် သွားမြစ်တုစိုက်ထားရင် တစ်သက်လုံး အသုံးပြုလို့ရတယ်ဆိုတာမျိုး အာမခံပေးထားတာထက် ဆောင်ရန်-ရှောင်ရန်-လိုက်နာရန် အချက်တွေကို သေသေချာချာ ရှင်းပြပြီး အကြောင်းအမျိုးမျိုးကြောင့် failure ရတတ်ကြောင်း ကြိုတင်သတိပေးထားသင့်ပါတယ်။



1. **Infection**:
   - Peri-implantitis: Inflammation of the tissues surrounding the implant, leading to bone loss.
   - Poor oral hygiene can contribute to bacterial infections around the implant.
2. **Insufficient Bone Quality and Quantity**:
   - Lack of adequate bone density and volume to support the implant.
   - Bone grafting may be necessary but can fail if not properly managed.
3. **Implant Overloading**:
   - Excessive force on the implant due to improper occlusion or bruxism (teeth grinding).
   - Can lead to implant fracture or bone loss.
4. **Surgical Complications**:

- Poor surgical technique or improper placement of the implant.
- Damage to surrounding structures, such as nerves or sinus perforation.

5. **Patient-Related Factors**:
   - Smoking, diabetes, and other systemic health conditions can impair healing and increase the risk of failure.
   - Poor compliance with post-operative care and maintenance.
6. **Material and Design Issues**:
   - Defects in the implant material or inappropriate design for the specific clinical scenario.
   - Poor compatibility with the patient's anatomy.
7. **Immediate Loading**:
   - Placing the implant under load too soon before sufficient osseointegration.
   - Can result in implant micromovement and failure to integrate properly with the bone.
8. **Foreign Body Reaction**:
   - The body's immune response to the implant as a foreign object.
   - Can cause chronic inflammation and implant rejection.
9. **Allergic Reactions**:
   - Hypersensitivity to titanium or other materials used in the implant can cause adverse reactions.
10. **Implant Design and Surface Properties**:
    - Suboptimal design or surface characteristics that do not promote adequate osseointegration.
11. **Occlusal Overload**:
    - Incorrect distribution of biting forces, especially in patients with parafunctional habits (e.g., clenching, bruxism).
12. **Adjacent Teeth or Implant Problems**:
    - Issues with neighboring teeth or other implants can affect the stability and health of the implant.
13. **Soft Tissue Concerns**:
    - Inadequate soft tissue coverage or poor quality of the mucosal seal around the implant can lead to failure.
14. **Biomechanical Factors**:
    - Improper distribution of mechanical forces, leading to micro-movements that prevent proper bone integration.
15. **Delayed Healing**:
    - Prolonged healing times due to systemic conditions or medications that affect bone metabolism.
16. **Improper Prosthetic Loading**:
    - Poor design or fit of the prosthetic component (crown, bridge, denture) attached to the implant.
17. **Failure to Achieve Primary Stability**:
    - Initial instability of the implant during placement can lead to micromovements and failure to integrate with the bone.
18. **Radiation Therapy**:
    - Previous radiation treatment to the jawbone area can compromise bone quality and healing capacity.
19. **Parafunctional Habits**:
    - Habits such as nail-biting, pencil chewing, or tongue thrusting that place undue stress on the implant.

20. **Medication Side Effects**:
    - Certain medications (e.g., bisphosphonates) can affect bone metabolism and healing.
21. **Genetic Predisposition**:
    - Some individuals may have a genetic predisposition to poor bone healing or integration with implants.

22. **Immediate Placement Post-Extraction**:
    - Placing an implant immediately after tooth extraction without sufficient healing time can lead to poor integration.
23. **Inadequate Blood Supply**:
    - Compromised blood supply to the implant site can affect healing and integration.
24. **Incorrect Implant Size or Position**:
    - Using an implant of inappropriate size or placing it at an incorrect angle can lead to biomechanical issues.
25. **Inexperienced Surgeon**:
    - Lack of experience and expertise in the clinician performing the implant procedure can result in technical errors.
26. **Poor Prosthetic Design**:
    - The design of the prosthetic restoration must ensure proper function and load distribution; poor design can cause failure.
27. **Failure to Address Occlusal Issues**:
    - Not managing occlusal discrepancies and misalignments can lead to excessive stress on the implant.
28. **Soft Tissue Health**:
    - Healthy gingival tissue is crucial for implant success; issues such as recession or inadequate keratinized tissue can contribute to failure.
29. **Previous Implant Failures**:
    - Patients with a history of previous implant failures may have underlying issues that could affect new implants.
30. **Poor Communication and Planning**:
    - Lack of thorough planning and communication between the surgical and prosthetic teams can result in suboptimal outcomes.
31. **Age-Related Factors**:
    - Advanced age can be associated with slower healing and lower bone density, affecting implant success.
32. **Nutritional Deficiencies**:
    - Deficiencies in essential nutrients like calcium, vitamin D, and protein can impair bone healing and osseointegration.
33. **Psychological Factors**:
    - Patient anxiety or unrealistic expectations can impact post-operative care and compliance.
34. **Lack of Regular Follow-Ups**:
    - Failure to attend regular follow-up appointments for monitoring and maintenance can lead to undetected issues and implant failure.
35. **Poor Initial Consultation and Assessment**:
    - Inadequate initial patient assessment can overlook critical factors like bone quality, systemic health, and oral hygiene status.

26. Basic Instruments

Basic Surgical Instruments

Scalpel and Blades: For precise incisions.

Periosteal Elevators: To elevate and reflect soft tissue flaps.

Tissue Forceps: For handling soft tissues delicately.

Implant Surgical Kit

Drill System: Includes pilot drills, twist drills, and countersink drills of various diameters.

Depth Gauge: To measure osteotomy depth and ensure correct placement.

Parallel Pins: To check the parallelism of multiple implant sites.

Implant Components

Implants: Sterile, appropriate size and type for the specific case.

Cover Screws/Healing Abutments: To protect the implant during the healing phase.

Temporary Abutments: For provisional restorations if immediate loading is planned.

Prosthetic Instruments

Impression Copings: For taking accurate impressions of the implant position.

Transfer Keys: To transfer implant positions to the laboratory model.

Screwdrivers: For various implant systems, including hex and torque drivers.

Bone Management Tools

Bone Chisels and Rongeurs: For reshaping and managing bone.

Bone Grafting Instruments: Curettes and bone carriers for graft material placement.

Soft Tissue Instruments

Suture Kit: Including needle holders, scissors, and various suture materials.

Hemostats: For controlling bleeding and tissue handling.

Sterilization and Infection Control

Autoclave: For sterilizing instruments before surgery.

Sterile Drapes and Covers: To maintain a sterile field.

Antiseptic Solutions: For prepping the surgical site.

Patient Management Tools

Local Anesthesia Setup: Syringes, needles, and anesthetic solutions.

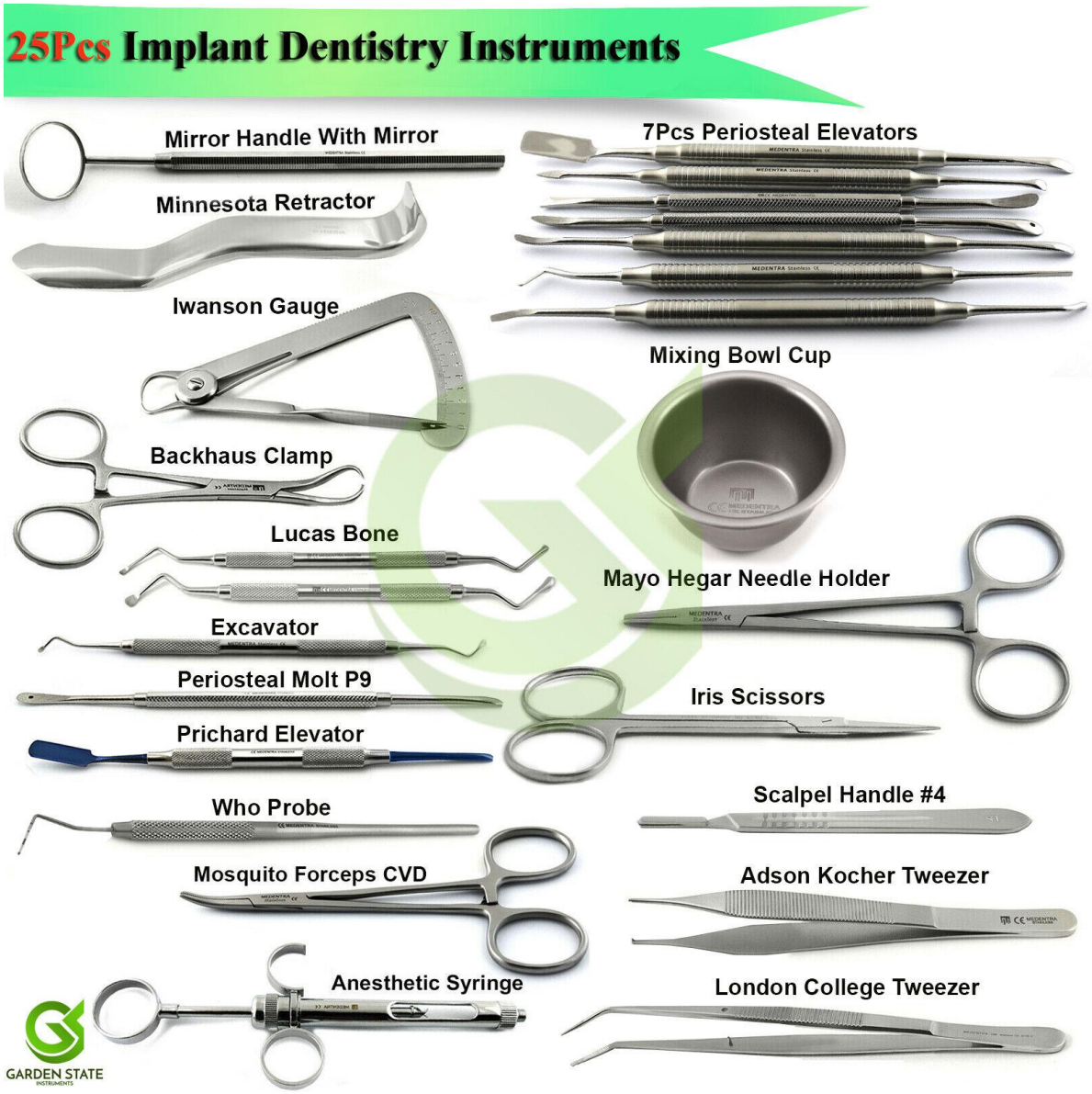
Suction Tips and Saliva Ejectors: For maintaining a clear surgical field.

Irrigation System: Sterile saline and irrigation syringes to cool the drill and flush the site.

Diagnostic Tools

Radiographic Equipment: Intraoral radiographs, panoramic X-rays, or CBCT for planning and verification.

Probes and Explorers: For assessing the surgical site and implant stability.



27. Drilling Protocol

Adhering to a structured drilling protocol enhances the success rate of dental implant placement by ensuring precise osteotomy creation and optimal implant stability.

Objective:

To create an osteotomy site in the jawbone for the precise placement of a dental implant.

Steps:

Pre-operative Planning:

Assess patient's medical history and oral health.

Use radiographic imaging (CBCT, X-rays) for bone quality and quantity evaluation.

Develop a surgical guide based on diagnostic data.

Patient Preparation:

Ensure patient is informed about the procedure and consents.

Administer appropriate anesthesia (local or general).

Maintain sterile environment to prevent infection.

Initial Drilling:

Mark the implant site using a surgical template.

Use a pilot drill to create an initial osteotomy, typically around 2mm in diameter.

Check alignment and depth with radiographs or surgical stents.

Sequential Drilling:

Progress through a series of drills with increasing diameters to widen the osteotomy.

Follow manufacturer-specific protocols for drill sizes and sequence.

Use copious irrigation to avoid overheating the bone.

Depth Control:

Ensure drills are marked or equipped with stoppers to control the depth of the osteotomy.

Verify depth periodically to match implant length.

Site Inspection:

Inspect the osteotomy site for proper shape and size.

Remove any bone debris or remnants with irrigation.

Implant Placement:

Place the implant into the osteotomy using an insertion tool.

Ensure proper torque and primary stability of the implant.

Adjust alignment if necessary to achieve optimal positioning.

Post-operative Care:

Suture the soft tissue to cover the implant if required.

Provide patient with post-operative instructions and medications (antibiotics, pain management).

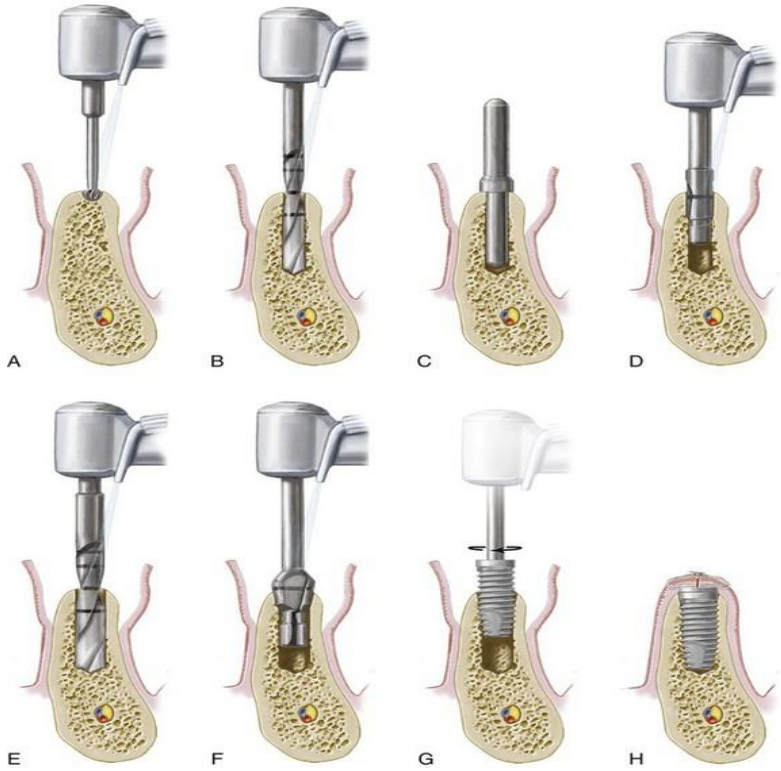
Schedule follow-up visits to monitor healing and osseointegration.

Considerations:

Adapt drilling protocol based on bone density (soft, medium, hard).

Maintain patient comfort and minimize trauma to surrounding tissues.

Ensure aseptic technique throughout the procedure.



Implant site preparation (osteotomy) for a 4.0-mm diameter, 10-mm length screw-type, threaded (external hex) implant in a sub-crestal position. **A,** Initial marking or preparation of the implant site with a round bur. **B,** Use of a 2-mm twist drill to establish depth and align the implant. **C,** Guide pin is placed in the osteotomy site to confirm position and angulation. **D,** Pilot drill is used to increase the diameter of the coronal aspect of the osteotomy site. **E,** Final drill used is the 3-mm twist drill to finish preparation of the osteotomy site. **F,** Countersink drill is used to widen the entrance of the recipient site and allow for the sub-crestal placement of the implant collar and cover screw. *Note:* An optional tap (not shown) can be used following this step to create screw threads in areas of dense bone. **G,** Implant is inserted into the prepared osteotomy site with a handpiece or handheld driver. *Note:* In systems that use an implant mount, it would be removed prior to placement of the cover screw. **H,** cover screw is placed and soft tissues are closed and sutured.

28. Suture

Interrupted Sutures

Versatility: Widely used for various surgical procedures.

Advantages: Easy to place and adjust, providing good wound edge approximation.

Application: Commonly used for closing flap margins and around individual implants.

Continuous Sutures

Speed: Faster to place over long incisions compared to interrupted sutures.

Advantages: Distributes tension evenly along the suture line, reducing the risk of dehiscence.

Application: Ideal for long incisions or where uniform tension distribution is needed.

Horizontal Mattress Sutures

Stability: Provides excellent wound edge eversion and stability.

Advantages: Reduces tension across the wound, minimizing the risk of wound separation.

Application: Useful for areas with high tension or for securing flaps in place.

Vertical Mattress Sutures

Precision: Ensures precise approximation of wound edges.

Advantages: Combines deep and superficial suturing, promoting good wound healing.

Application: Effective in areas where deep tissue support is needed.

Figure-of-Eight Sutures

Security: Provides additional security and stability to the suture line.

Advantages: Reduces the risk of tissue eversion and dehiscence.

Application: Often used around dental implants or to secure graft materials.

Continuous Interlocking Sutures

Strength: Provides a secure and tight closure.

Advantages: Distributes tension evenly and resists suture line separation.

Application: Suitable for long incisions or areas under significant stress.

Sling Sutures

Support: Provides support to soft tissues around implants.

Advantages: Allows for precise positioning of tissues around the implant site.

Application: Commonly used in peri-implant soft tissue management.

These techniques are selected based on the specific surgical requirements, the anatomical location, and the desired outcome for tissue healing and implant stability.

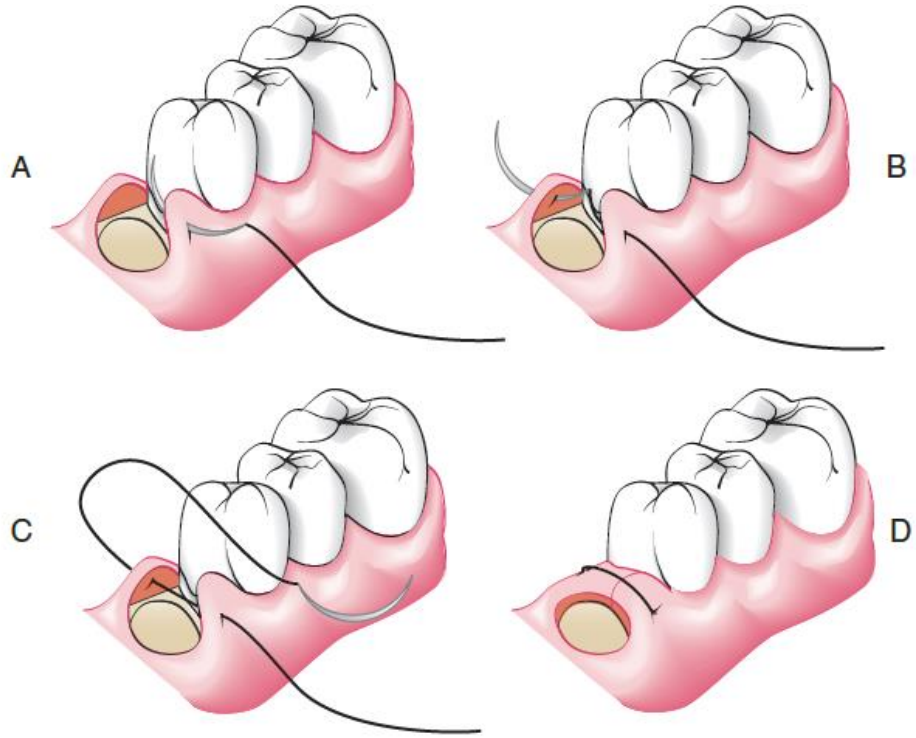


FIGURE 9-7 ■ Simple loop suture is used to approximate the buccal and lingual flaps. **A,** Needle penetrates the outer surface of the first flap. **B,** Undersurface of the opposite flap is engaged, and the suture is brought back to the initial side (**C**), where the knot is tied (**D**). (From Newman MG et al: *Carranza's clinical periodontology*, ed 10, St. Louis, 2006, Saunders Elsevier.)

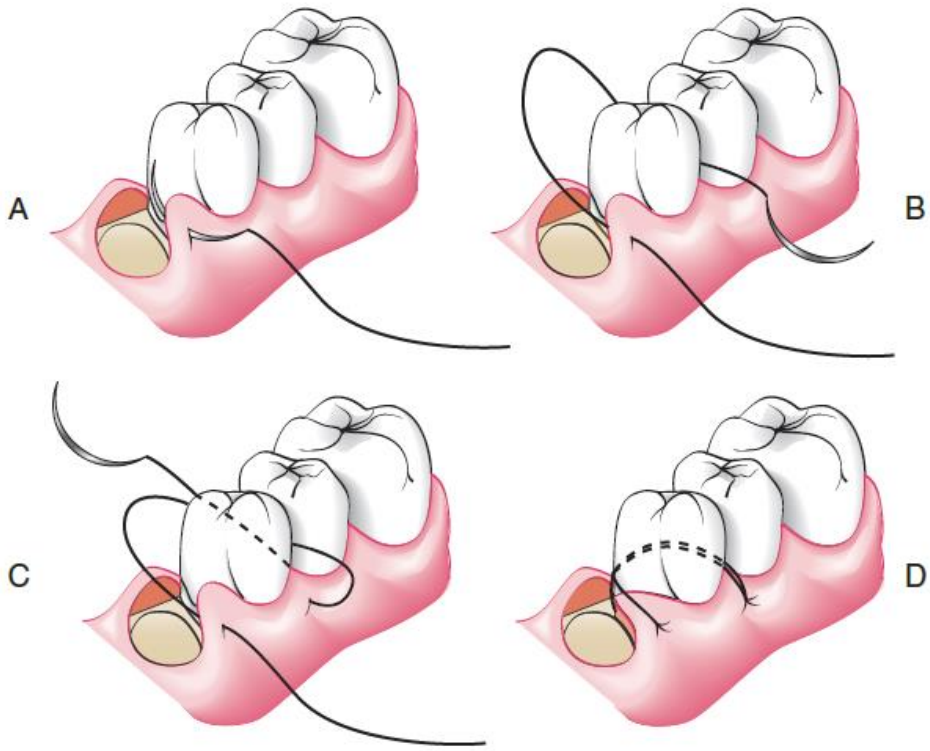


FIGURE 9-8 ■ Single, interrupted sling suture is used to adapt the flap around the tooth. **A,** Needle engages the outer surface of the flap and encircles the tooth (**B**). **C,** Outer surface of the same flap of the adjacent interdental area is engaged. **D,** Suture is returned to the initial site and the knot is tied. (From Newman MG et al: *Carranza's clinical periodontology*, ed 10, St. Louis, 2006, Saunders Elsevier.)

29. Occlusion

Managing occlusion in dental implantology involves careful planning, regular monitoring, and appropriate adjustments to distribute occlusal forces evenly, prevent implant overload, and ensure the long-term success of the implant-supported prosthesis.

Occlusal Load Distribution: Properly distribute occlusal forces to prevent implant overload and ensure longevity of the prosthetic restoration.

Occlusal Scheme:

Canine Guidance: Often preferred for single implants and fixed partial dentures to control lateral forces.

Group Function: May be used in cases with multiple implants or full-arch restorations to distribute occlusal forces evenly across several teeth.

Occlusal Adjustments: Regularly assess and adjust occlusion to accommodate changes in the prosthesis or natural dentition, preventing excessive stress on implants.

Occlusal Surfaces: Design prosthetic crowns and bridges with appropriate occlusal anatomy to ensure even contact and force distribution during function.

Implant-Protected Occlusion: A concept aiming to minimize lateral forces and ensure axial loading on implants, enhancing stability and longevity.

Prosthetic Design:

Cuspal Inclination: Shallower cuspal inclines reduce lateral forces and stress on implants.

Occlusal Table Width: Narrower occlusal tables help in reducing the lateral loads on implants.

Bite Force Considerations: Recognize the increased bite force in implant-supported prostheses compared to natural teeth, necessitating careful occlusal planning.

Monitoring and Maintenance: Regular follow-ups to monitor occlusal wear, detect early signs of occlusal overload, and make necessary adjustments to maintain implant health.

Inter-arch Relationships: Ensure proper alignment and coordination between upper and lower arches to achieve balanced and stable occlusion.

Parafunctional Habits: Identify and manage habits like bruxism or clenching, which can exert excessive forces on implants, using occlusal guards if necessary.

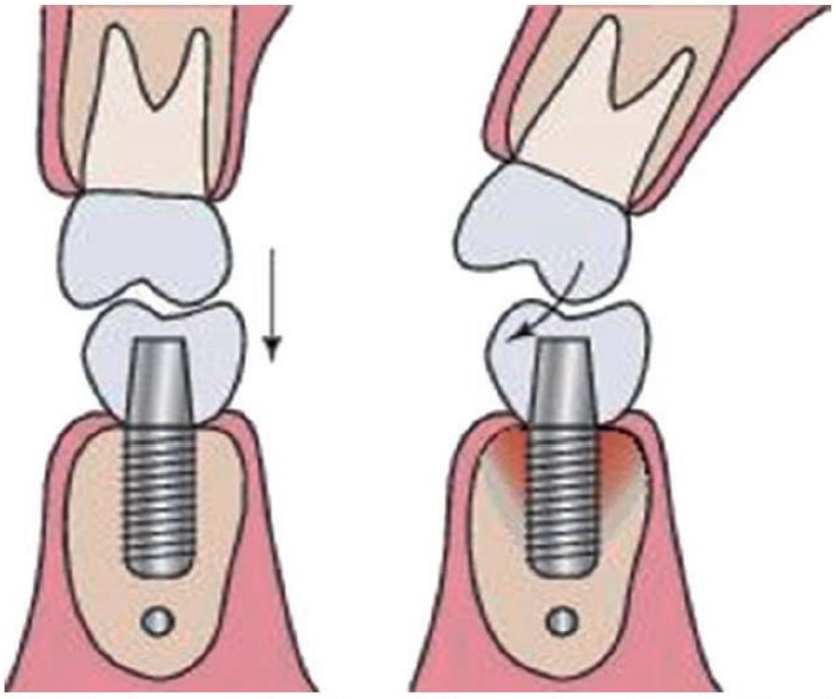


FIGURE IV-1. Off-axis loading can result in unfavorable forces on the implant, jeopardizing the long-term success because of excessive lateral loads.[1]

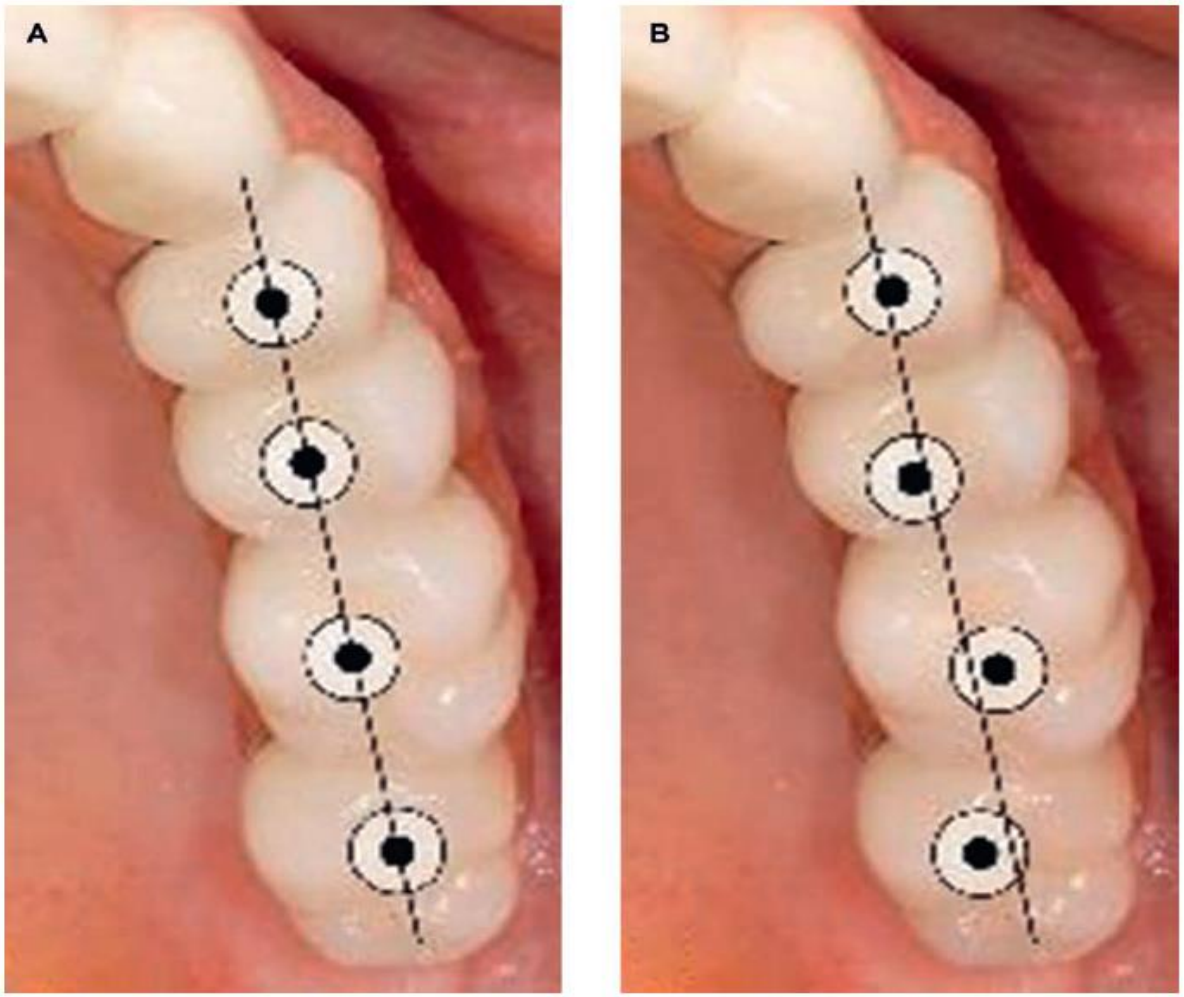


FIGURE IV-2. Placement of implants. *A*, Linear placement of 4 implants. Lateral forces can result in eventual bone loss and implant failure. *B*, *A* slightly staggered arrangement provides more 3-dimensional stability.[1]

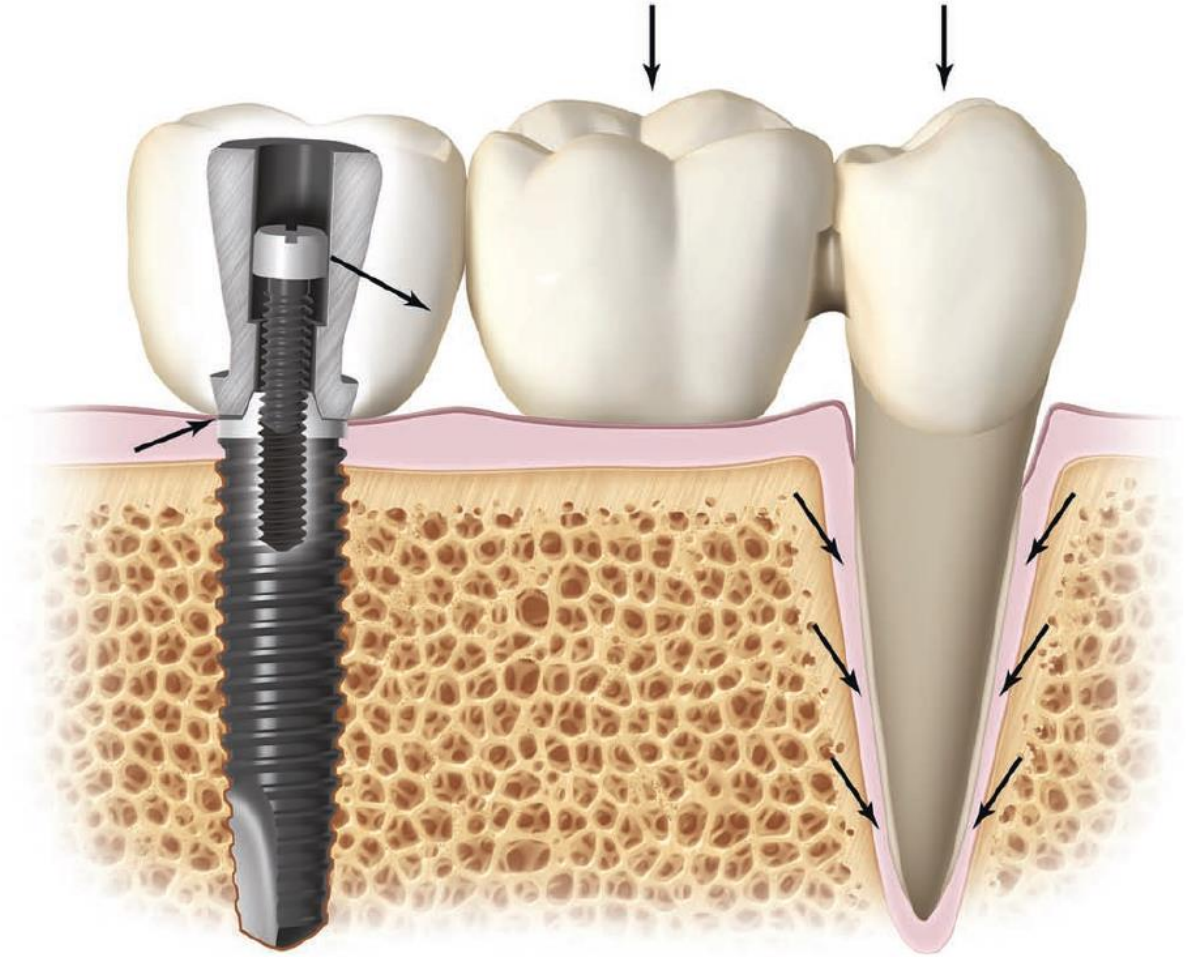


FIGURE IV-3. If an implant-supported crown is used as an abutment for a bridge using a natural tooth as the other abutment, the stress from the occlusal forces will be concentrated at the superior portion of the implant and can lead to fracture of the implant screw or abutment.

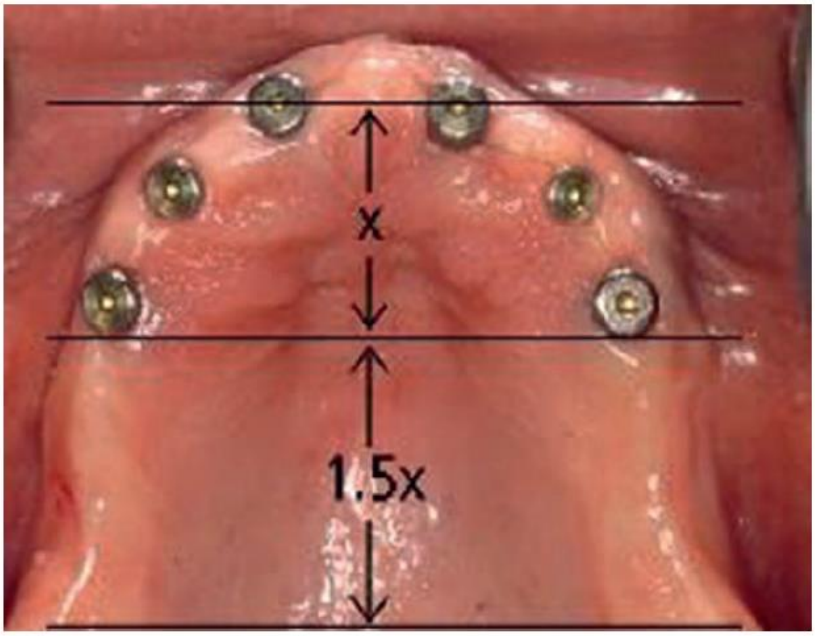
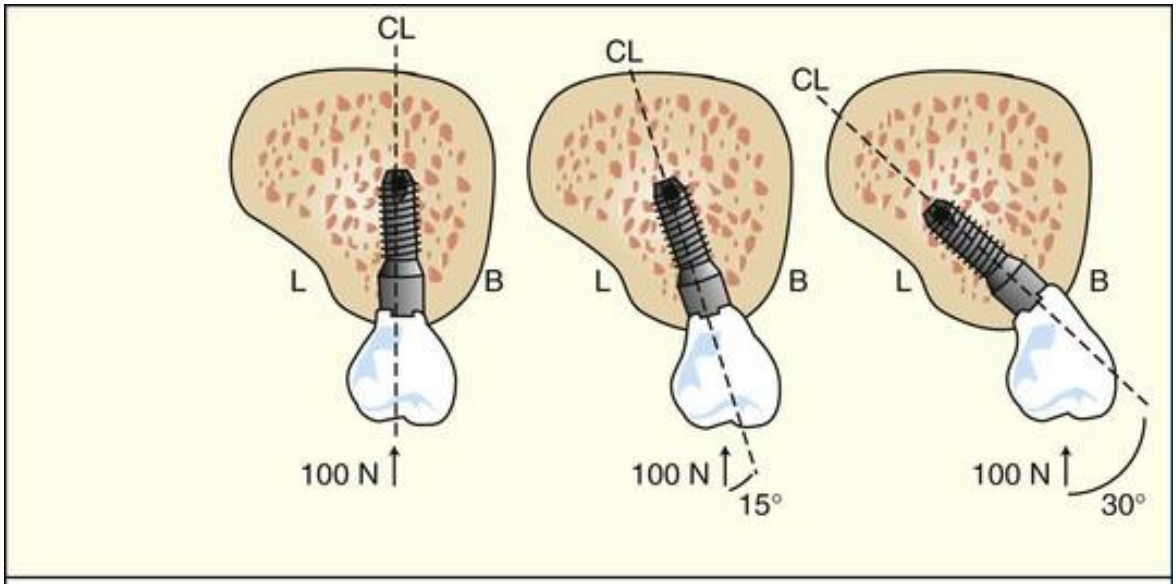


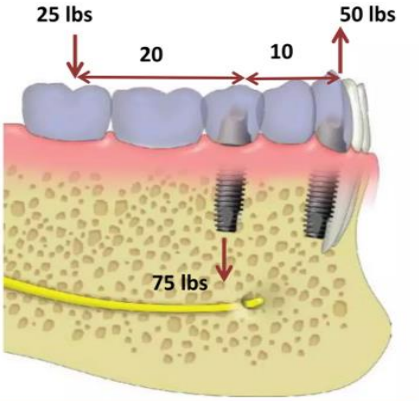
FIGURE IV-7. Anteroposterior spread lines for cantilever stability. Edentulous maxilla with 6 implants placed and depiction of the quantitative determination for the ability to extend a prosthesis or framework.[1]



Crestal moment load	0	0	0
Axial force component	100 N	96.9 N	86.6 N
Buccal force component	0	25.9 N	50.0 N

An implant loaded in the long axis does not increase the buccal force component of the load *(far left).* A 15-degree angle increases the buccal force component by 25.9% *(middle).* A 30-degree angle load increases the force by 50%. When the forces are applied along the long axis of an implant body, stresses are concentrated on the crestal region *(far left)*. The intensity of the stress is not increased as a result of the position of the implant. The implant body in the center is 15 degrees off the long axis. With an angled abutment of 15 degrees, the implant restoration is similar to the previous situation. However, now 25.9% greater stress is on the crestal bone; all other factors are similar. The implant body on the *far right* is 30 degrees off the long-axis load. With a 30-degree angled abutment, the crown may appear similar. However, the abutment screw, abutment–implant connection, and implant–bone interface are subject to a 50% increase in stress on the facial aspect of the system. (From Misch CE: *Contemporary implant dentistry*, ed 2, St Louis, 1999, Mosby.)

- Cantilevers are class-1 levers, which increase the amount of stress on implants.
- Twice the load applied at the cantilever will act on the abutment farthest from the cantilever, and the load on the abutment closest to cantilever is the sum of the other two components.

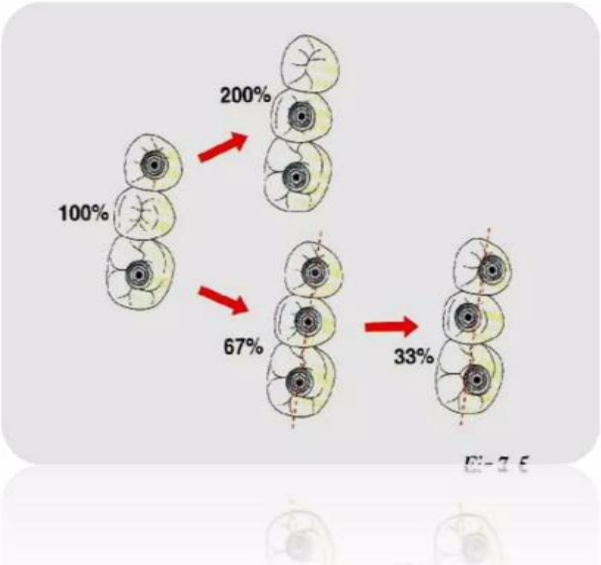


For example, a 100-N force on the cantilever equals a 200-N tensile or shear force on the most distal abutment and a 300-N Compressive force on the abutment (the fulcrum) next to the lever.

•If a 3 unit fixed prosthesis supported by 2 implants is cantilevered, stress is doubled.

•If a 3 unit F.P.D is supported by 3 implants stress is reduced to 1/3rd .

Splinted larger diameter of implants decrease crestal load more Effectively(Sato Y ,et.al, 2000)



Multiple implants must be staggered not placed in straight line

Possible Overloading Factors

Overextended cantilever
- > 15 mm in the mandible (Shackleton et al. 1994)
- > 10–12 mm in the maxilla (Rangert et al. 1989; Taylor 1991)

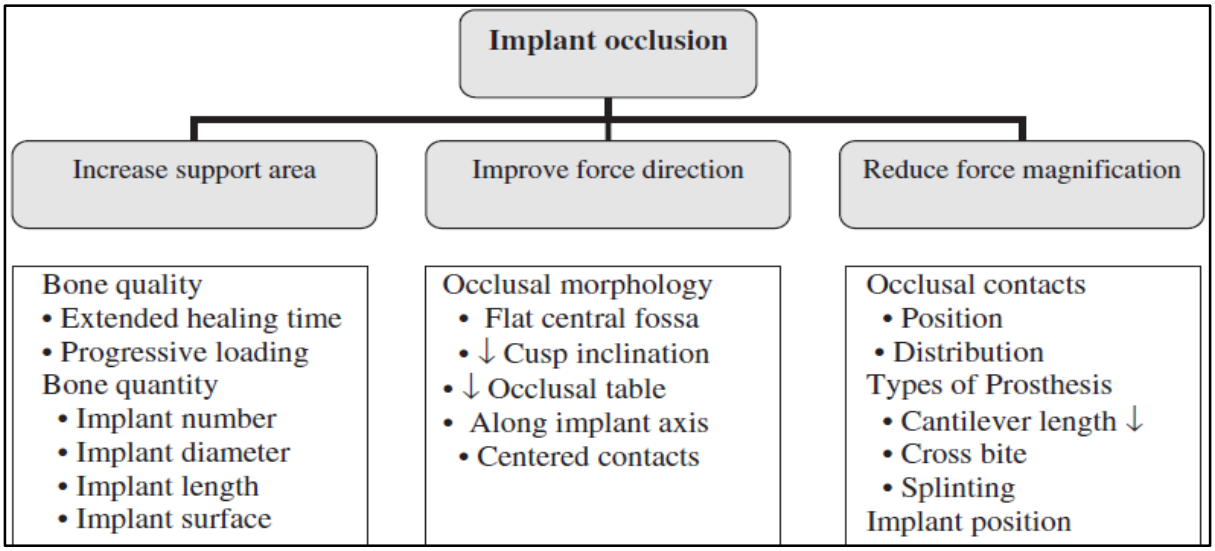
Parafunctional habits/Heavy bite force
Excessive premature contacts
- > 180 μm in monkey studies (Miyata et al. 2000)
- > 100 μm in human (Falk et al. 1990)

Large occlusal table
Steep cusp inclination
Poor bone density/quality
Inadequate number of implants

Occlusal guidelines

Clinical situations	Occlusal principles
Full-arch fixed prosthesis	• Bilateral balanced occlusion with opposing complete denture • Group function occlusion or mutually protected occlusion with shallow anterior guidance when opposing natural dentition • No working and balancing contact on cantilever • Infraocclusion in cantilever segment (100 μm) • Freedom in centric (1–1.5 mm)
Overdenture	• Bilateral balanced occlusion using lingulized occlusion • Monoplane occlusion on a severely resorbed ridge
Posterior fixed prosthesis	• Anterior guidance with natural dentition • Group function occlusion with compromised canines • Centered contacts, narrow occlusal tables, flat cusps, minimized cantilever • Cross bite posterior occlusion when necessary • Natural tooth connection with rigid attachment when compromised support
Single implant prosthesis	• Anterior or lateral guidance with natural dentition • Light contact at heavy bite and no contact at light bite • Centered contacts (1–1.5 mm flat area) • No offset contacts • Increased proximal contact
Poor quality of bone/Grafted bone	• Longer healing time • Progressive loading by staging diet and occlusal contacts/materials

Factors to consider in implant occlusion



30. Soft Tissue Augmentation Techniques

Connective Tissue Grafts (CTG)

Procedure: Harvests connective tissue from a donor site, typically the palate, and places it around the implant to increase soft tissue volume and improve aesthetics.

Indications: Used for augmenting thin gingival biotypes, covering exposed implant surfaces, and enhancing peri-implant aesthetics.

Free Gingival Grafts (FGG)

Procedure: Involves taking a section of tissue from the palate or another donor site and grafting it to the recipient site to increase the width of keratinized tissue.

Indications: Effective for increasing keratinized tissue around implants to improve hygiene and reduce inflammation.

Allogenic Soft Tissue Grafts

Materials: Uses donor tissue (e.g., AlloDerm) processed to remove cellular components while retaining the extracellular matrix.

Benefits: Eliminates the need for a second surgical site, reducing patient morbidity while providing volume and stability.

Xenogenic Soft Tissue Grafts

Materials: Uses animal-derived tissues (e.g., porcine collagen) processed to be biocompatible and safe for human use.

Applications: Provides a scaffold for soft tissue regeneration, often used in conjunction with autogenous grafts.

Soft Tissue Substitutes

Materials: Synthetic or natural materials that mimic the properties of natural soft tissue, such as collagen matrices or acellular dermal matrices.

Indications: Used when autogenous grafts are not feasible or to enhance the volume and quality of peri-implant soft tissue.

Pedicle Grafts

Procedure: Uses adjacent tissue that remains attached at one end (pedicle) to cover defects or augment soft tissue around implants.

Benefits: Maintains blood supply from the pedicle, enhancing graft survival and integration.

Coronally Advanced Flaps (CAF)

Technique: Involves repositioning the gingival tissue coronally to cover exposed implant surfaces or augment the soft tissue profile.

Applications: Effective for treating gingival recession and improving aesthetics around implants.

Vascularized Interpositional Periosteal-Connective Tissue (VIP-CT) Flap

Technique: Combines a connective tissue graft with a flap that retains its blood supply to enhance vascularization and healing.

Benefits: Provides robust tissue coverage with excellent vascular support for implant sites.

Soft Tissue Expansion

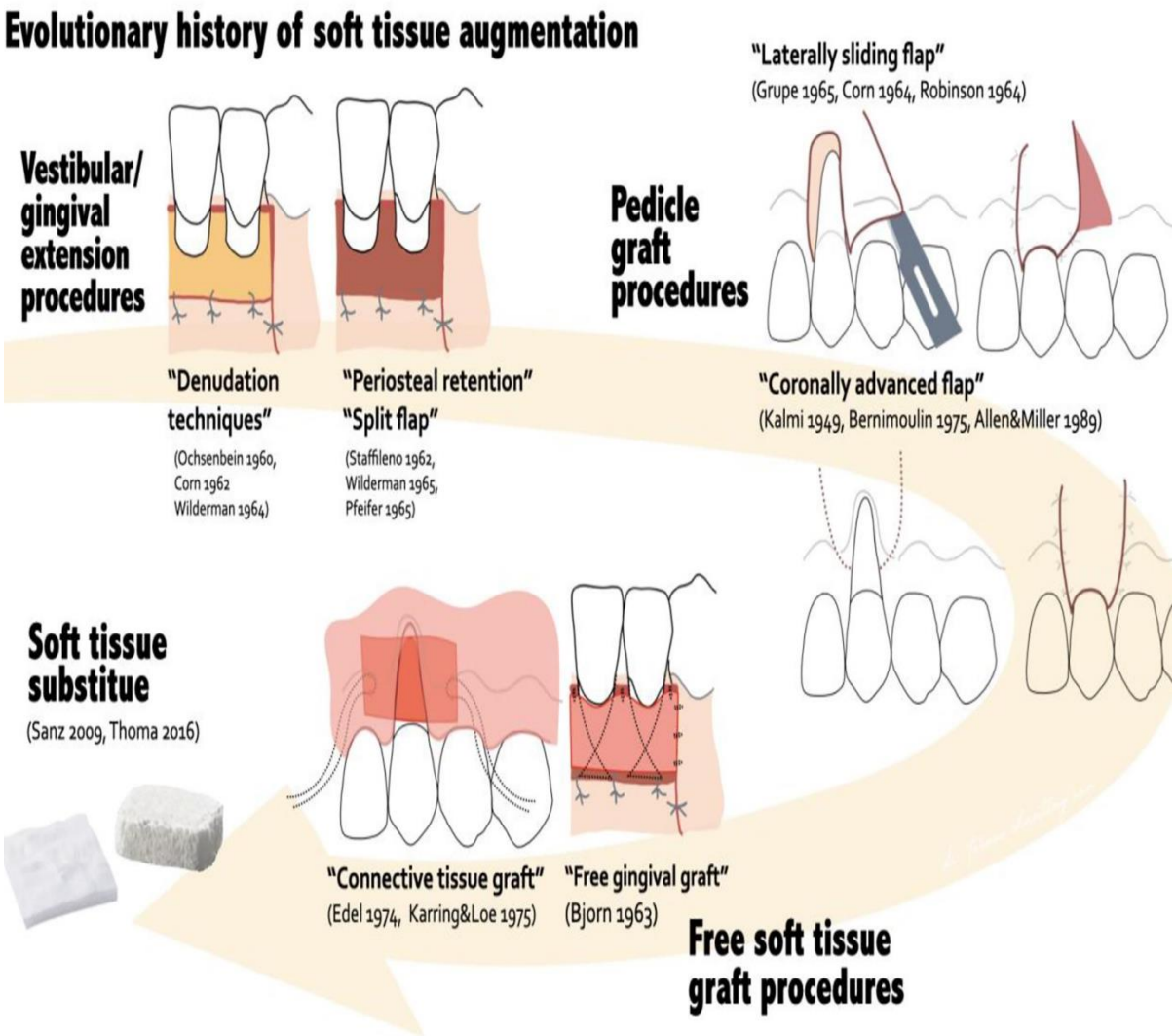
Technique: Gradually expands the soft tissue using inflatable devices or other means to create additional soft tissue volume for implant sites.

Indications: Useful in cases with limited soft tissue availability, providing sufficient tissue for coverage and aesthetics.

Minimally Invasive Techniques

Methods: Utilizing techniques such as tunneling or pinhole approaches to place grafts with minimal incisions and reduced patient discomfort.

Benefits: Promotes faster healing and less postoperative pain while achieving effective soft tissue augmentation.



31. Alveolar Ridge Split/Expansion

Indications

Narrow Alveolar Ridge: Used primarily to widen narrow alveolar ridges for implant placement.

Anterior Maxilla: Often indicated in the anterior maxilla due to its thinner cortical bone.

Horizontal Bone Deficiency: Effective for horizontal bone augmentation in cases with sufficient vertical bone height.

Minimal Bone Resorption: Best suited for cases with minimal bone resorption where other grafting techniques are not necessary.

Contraindications

Severe Bone Resorption: Not suitable for severely resorbed ridges with insufficient vertical bone height.

Poor Bone Quality: Avoid in patients with poor bone quality or density.

Infection or Pathology: Contraindicated in the presence of active infections or pathological conditions at the surgical site.

Medical Conditions: Patients with systemic conditions affecting bone healing, such as uncontrolled diabetes or osteoporosis.

Guidelines

Preoperative Assessment: Thorough clinical and radiographic evaluation to assess ridge width and bone quality.

Patient Selection: Careful selection of patients based on indications and contraindications.

Surgical Technique: Use piezoelectric or motorized saws for precise osteotomies, followed by gradual expansion with chisels or expanders.

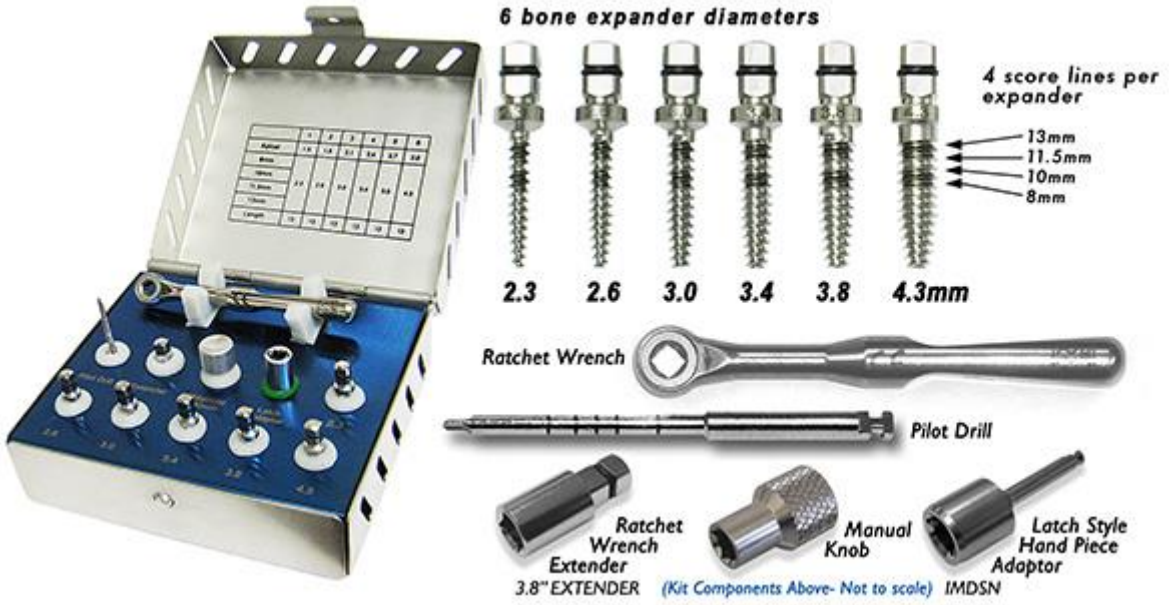
Flap Management: Proper flap design to ensure adequate blood supply and minimize soft tissue complications.

Postoperative Care: Adequate postoperative care, including antibiotics, analgesics, and soft diet to ensure proper healing.

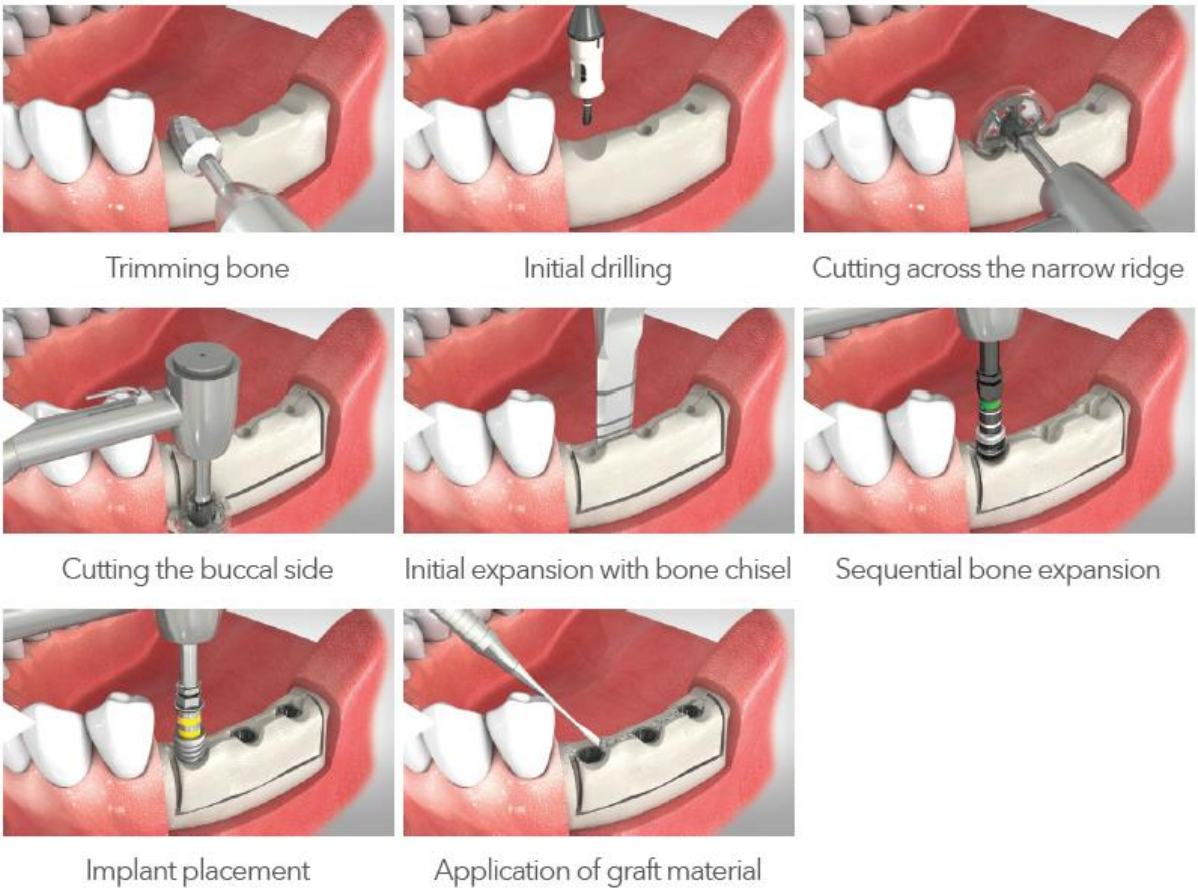
Follow-up: Regular follow-up to monitor healing and detect any complications early.

Training and Experience: Ensure the procedure is performed by clinicians with adequate training and experience in ridge expansion techniques.

Ridge Expansion Kit



Ridge Split



32.Socket Shield Technique

Indications

Immediate Implant Placement: Suitable for cases where immediate implant placement is planned.

Preservation of Buccal Plate: Ideal for maintaining the buccal bone plate in the anterior maxilla.

Aesthetic Areas: Recommended in aesthetic zones to preserve gingival contour and avoid soft tissue recession.

Thin Buccal Bone: Effective in patients with thin buccal bone where conventional extraction may lead to bone loss.

Contraindications

Infection or Inflammation: Not recommended in sites with active infection or chronic inflammation.

Severe Bone Loss: Avoid in cases with significant buccal bone loss or dehiscence.

Complex Root Anatomy: Contraindicated in teeth with complex root anatomy that complicates partial extraction.

Periodontal Disease: Not suitable for teeth with advanced periodontal disease or severe mobility.

Guidelines

Preoperative Planning: Detailed clinical and radiographic evaluation, including CBCT, to assess root and bone morphology.

Partial Extraction: Carefully section and preserve the buccal portion of the root, ensuring it remains stable and intact.

Flapless Approach: Utilize a flapless or minimally invasive approach to preserve blood supply and soft tissue integrity.

Implant Positioning: Place the implant palatally or centrally, ensuring primary stability without disturbing the socket shield.

Shield Preparation: Smooth and reduce the shield to below the bone crest level to avoid exposure.

Postoperative Care: Provide appropriate postoperative care, including antibiotics, analgesics, and soft diet recommendations.

Follow-up: Schedule regular follow-up visits to monitor healing, shield stability, and implant integration.

Surgeon Experience: Ensure the procedure is performed by a clinician experienced in the socket shield technique to minimize risks and complications.

SOCKET SHIELD TECHNIQUE – A GUARD

HURZLER ET AL 2010

INDICATION

a. Unrestorable crown
b. Tooth with or without periapical pathology
c. Immediate implant placement
d. Preserves the ridge – by preventing the buccal collapse

CONTRAINDICATION

a. Mobile teeth
b. Large periapical pathology
c. Teeth out of arch
d. Vertical root fracture
e. Bisphosphonates
f. Radiation therapy
g. Anti coagulant therapy

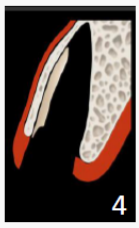
PROCEDURE

Tooth split supra gingivally and crown fragment is removed.

Root divided as 1:3 and 2:3 ratio using long shank root resection bur

Palatal 2/3rd root is removed. Width of buccal shield retained is 1.5-2mm

The height of buccal shield is reduced to alveolar crest level and S-shaped bevel given.



Implant placed with optimum gap of 1.5mm from the shield. >3mm gap – grafting done

Restored with crown

ADVANTAGES:

- ✓ Minimally invasive procedure
- ✓ Preserve the root – maintaining hard tissues & soft tissue contour
- ✓ No grafting required
- ✓ Decreased treatment duration
- ✓ Maintains tooth esthetics

DISADVANTAGES:

- Technically sensitive
- Displacement of buccal root fragment
- Long term results – not available

COMPLICATIONS:

- Implant failure
- Infection
- Exposure of socket shield
- Mobility of socket shield
- Migration of the buccal fragment

33.Flapless Dental Implant Placement

Indications

Adequate Bone Volume: Sufficient bone height and width for implant stability without the need for additional bone grafting.

Good Soft Tissue Health: Healthy soft tissue with adequate keratinized gingiva around the implant site.

Single Tooth Replacement: Often used for single tooth replacement in aesthetic zones to preserve soft tissue contours.

Patient Preference: Patients desiring a less invasive procedure with reduced postoperative discomfort and faster recovery.

Experienced Clinician: Suitable for clinicians with significant experience and precision in implant placement.

Contraindications

Inadequate Bone Volume: Insufficient bone volume or quality requiring bone augmentation procedures.

Compromised Soft Tissue: Poor soft tissue health, lack of keratinized gingiva, or thin biotype that may compromise outcomes.

Complex Anatomical Structures: Proximity to critical anatomical structures (e.g., nerves, sinus) that require visual access during surgery.

Inflammation or Infection: Presence of active infection or inflammation at the implant site.

Uncontrolled Systemic Conditions: Patients with systemic conditions affecting healing, such as uncontrolled diabetes.

Guidelines

Preoperative Assessment: Comprehensive clinical and radiographic evaluation, including CBCT, to assess bone and soft tissue conditions.

Treatment Planning: Detailed planning using digital tools and guided surgery techniques to ensure precise implant placement.

Minimally Invasive Technique: Perform the procedure without raising a flap, using a tissue punch or guided drill to create the implant osteotomy.

Implant Positioning: Ensure accurate implant positioning and angulation to avoid complications and ensure optimal prosthetic outcomes.

Primary Stability: Achieve adequate primary stability of the implant for successful osseointegration.

Immediate Restoration: Consider immediate provisional restoration if primary stability and occlusal conditions allow.

Postoperative Care: Provide detailed postoperative instructions, including hygiene maintenance and dietary recommendations.

Follow-up: Schedule regular follow-up visits to monitor healing, check implant stability, and assess soft tissue integration.

Surgeon Expertise: Ensure the procedure is performed by a clinician with expertise in flapless implant placement to minimize risks and enhance success rates.

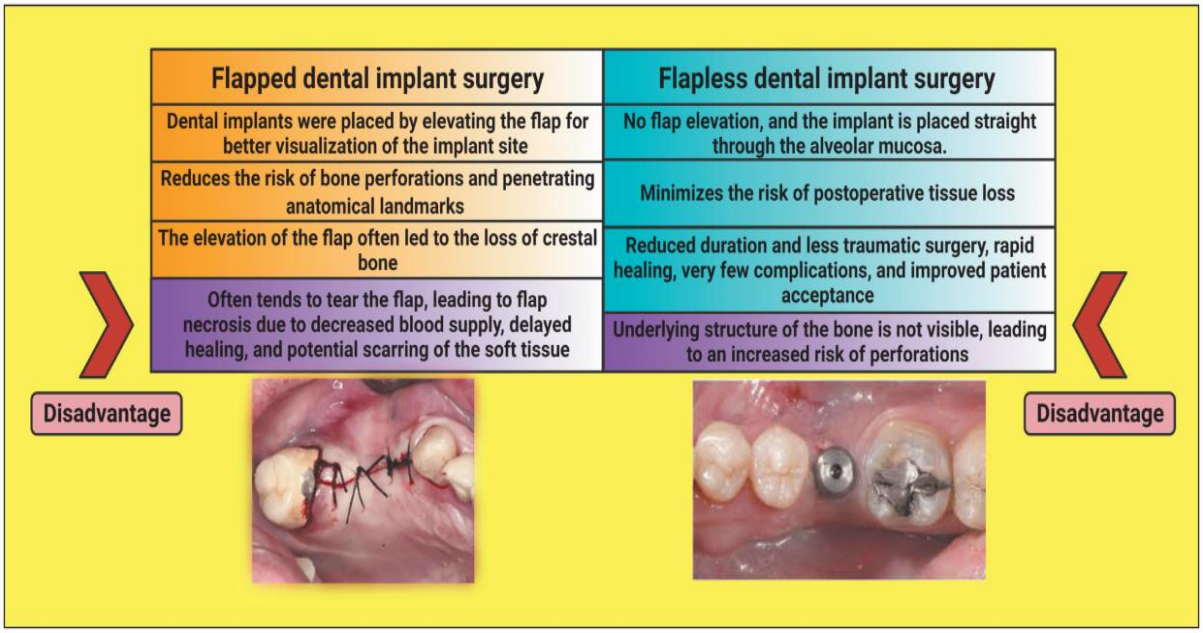


Figure 1. Chart showing the comparison between flapped and flapless implant surgery. This figure has been drawn utilizing the premium version of BioRender with the License number KA256LFY6Y. Image Credit: Susmita Sinha.

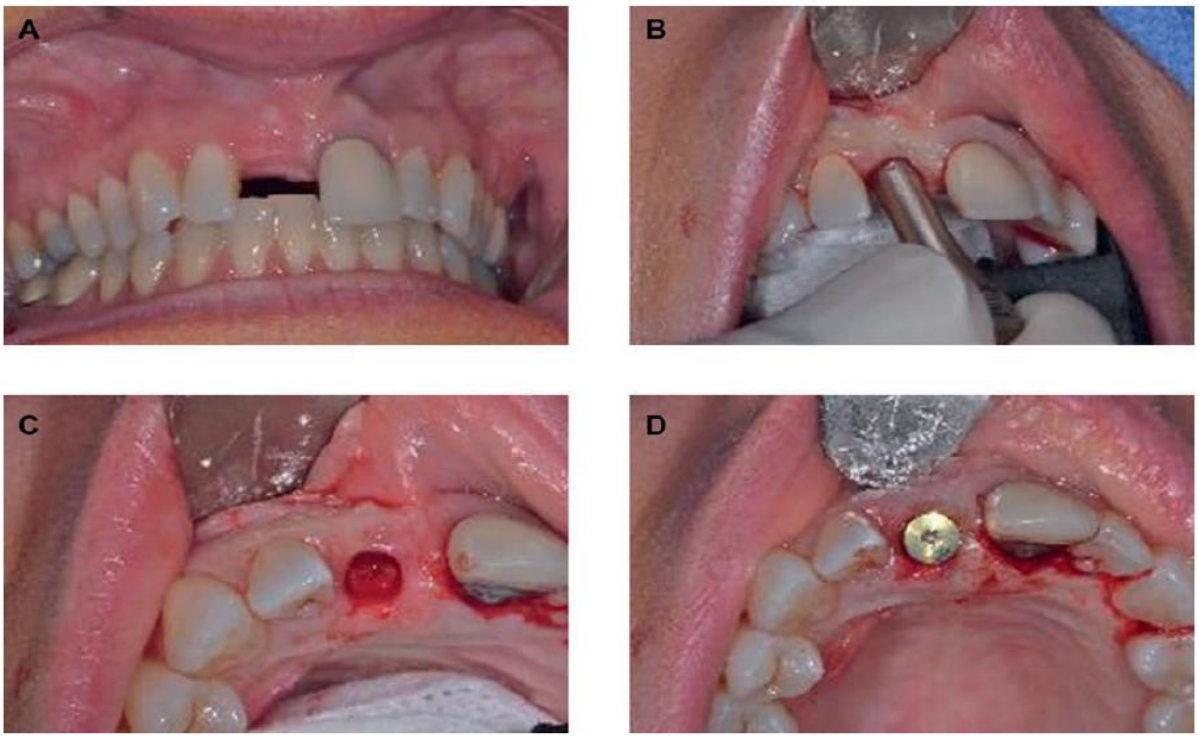


FIGURE VI-1. Flapless surgery. *A*, Preoperative view. *B*, Tissue excised in the exact diameter of the implant to be placed using a tissue punch. *C*, Tissue removed. *D*, Implant placement.[1]

34.Immediate Implant Placement After Tooth Extraction

- **Indications**
    - Suitable for single or multiple tooth extractions where sufficient primary stability can be achieved.
    - Ideal for patients with good oral hygiene and without active infections at the extraction site.
- **Pre-Surgical Assessment**
    - Conduct a thorough clinical examination and radiographic evaluation using CBCT scans.
    - Assess bone quality, quantity, and the presence of any infection or pathology.
- **Extraction Technique**
    - Perform atraumatic extraction to preserve the alveolar bone and soft tissue.
    - Use periotomes or piezosurgery to minimize trauma.
- **Implant Placement**
    - Select an implant with appropriate dimensions to achieve primary stability.
    - Place the implant in the optimal position to ensure proper prosthetic alignment.
    - Consider using bone grafts to fill any gaps between the implant and the socket walls.
- **Primary Stability**
    - Ensure adequate primary stability (≥35 Ncm insertion torque) for immediate placement.
    - Utilize adjunctive measures such as guided bone regeneration (GBR) if necessary.
- **Soft Tissue Management**
    - Preserve and adapt the soft tissue to achieve good esthetic outcomes.
    - Consider connective tissue grafts or soft tissue substitutes if needed.
- **Provisionalization**
    - Provide a temporary restoration if immediate loading is planned, ensuring it is out of occlusion to avoid premature loading.
    - Ensure the provisional restoration supports soft tissue healing and maintains the emergence profile.
- **Post-Operative Care**
    - Prescribe antibiotics, analgesics, and chlorhexidine mouthwash.
    - Advise the patient on a soft diet and to avoid disturbing the surgical site.
- **Follow-Up**

- Schedule regular follow-up appointments to monitor healing and osseointegration.
- Assess soft tissue condition and implant stability at each visit.

- **Patient Education**

  - Instruct the patient on maintaining excellent oral hygiene.
  - Provide detailed post-operative care instructions and address any concerns promptly.

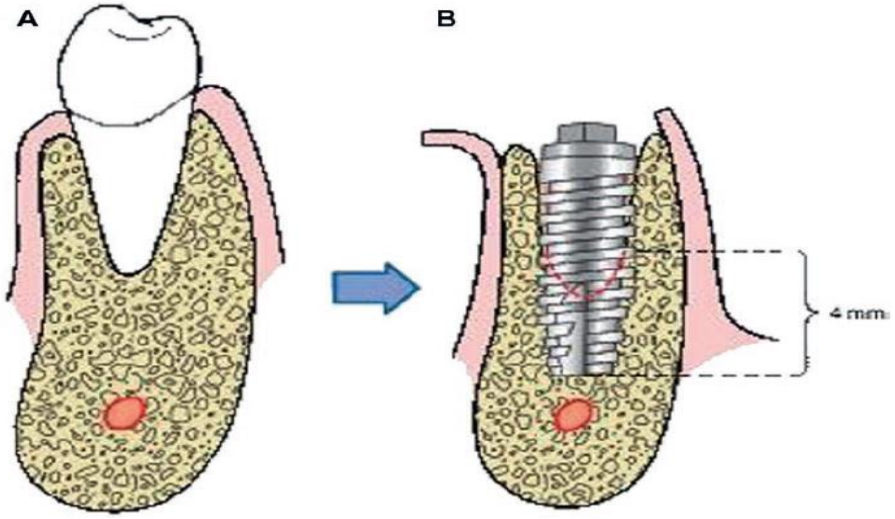


FIGURE VIII-1. *A, B,* An implant placed into a fresh extraction socket must have a precise fit along the apical 4 mm of the implant. The implant should be countersunk below the crest of the bone. Gaps between the implant and tooth socket are most often grafted with autogenous or allogeneic bone, with or without bone morphogenetic protein.[1]

Table 4. Possible Therapies Available to Treat the Buccal Gap After Immediate Implant Placement: With and Without Flap Elevation[56]

A. WITH FLAP ELEVATION	ADVANTAGE	DISADVANTAGE
1. NO ADDITIONAL TREATMENT (NO BONE GRAFT OR BARRIER USED)		
a. Flap placed over the defect	Covers defect	This may require flap advancement Increased morbidity (edema and ecchymosis) Soft tissue may invade gap
b. Flap positioned at bone crest leaving the gap exposed	Easier	Plaque and food may get trapped in void if clot is not retained
2. BONE GRAFT PLACED INTO THE DEFECT WITH OR WITHOUT GROWTH FACTORS		
a. Flap placed over the defect	Covers defect	This may require flap advancement Increased morbidity (edema and ecchymosis) Soft tissue may invade bone graft
b. Flap positioned at bone crest, leaving the gap exposed	Easier	Plaque and food may get trapped in void if clot is not retained
3. BARRIER PLACED OVER DEFECT		
a. Flap advancement is usually necessary to attain primary closure	Covers barrier	Increased morbidity (edema and ecchymosis)
b. No flap advancement and use of nonresorbable or resorbable barrier or connective tissue graft	Easier	Nonresorbable barrier-exposure/infection Resorbable barrier-rapid dissolution in mouth
4. BARRIER PLACED OVER BONE GRAFT		
a. Flap advancement is usually necessary to attain primary closure	Covers barrier	Increased morbidity (edema and ecchymosis) Nonresorbable barrier-exposure/infection
b. No flap advancement and use of nonresorbable or resorbable barrier or connective tissue graft	Easier	Nonresorbable barrier-exposure/infection Resorbable barrier-rapid dissolution in mouth
5. TEMPORIZATION OF IMPLANT AND ABUTMENT	Supports soft tissue	Additional work at time of surgery Sufficient primary stability required Reasonable restorative position required
B. NO FLAP ELEVATION (FLAPLESS IMPLANT INSERTION)	**ADVANTAGE**	**DISADVANTAGE**
1. THE GAP IS LEFT OPEN WITH NO ADDITIONAL THERAPY	Easier	Plaque and food may get trapped in void if clot is not retained
2. BONE IS PLACED WITHIN THE GAP		Bone particles may be displaced
3. TEMPORIZATION OF IMPLANT AND ABUTMENT WITH EITHER OF THE ABOVE	Supports soft tissue	Additional work at time of surgery

35.PRF

Protocol for PRF (Platelet-Rich Fibrin)

Blood Collection: Collect patient's blood in 10 mL glass-coated tubes without anticoagulants.

Centrifugation

Use a centrifuge at 2700 rpm for 12 minutes.

The process separates the blood into three layers: red blood cells at the bottom, PRF clot in the middle, and platelet-poor plasma at the top.

Collection of PRF

Extract the PRF clot from the middle layer using sterile instruments.

Remove any red blood cells attached to the PRF clot.

Usage: Use the PRF clot immediately for surgical procedures or store it temporarily in a sterile environment if needed.

Advantages of PRF

Enhanced Healing: Promotes faster and more effective tissue regeneration due to the presence of growth factors.

Autologous Nature: Derived from the patient's own blood, reducing the risk of immune reactions and infections.

Cost-Effective: Relatively low cost compared to other biomaterials and growth factor products.

Versatility: Can be used in various dental and medical procedures, including implantology, oral surgery, and wound healing.

Simple Preparation: Requires minimal preparation time and equipment.

Uses of PRF

Dental Implants: Enhances bone regeneration and soft tissue healing around implants.

Periodontal Surgery: Improves healing in periodontal defects and gum surgeries.

Oral and Maxillofacial Surgery: Assists in bone grafting, sinus lifts, and other reconstructive procedures.

Wound Healing: Promotes healing in chronic wounds, ulcers, and post-surgical sites.

Aesthetic Medicine: Used in facial rejuvenation and other cosmetic procedures to enhance skin healing and regeneration.

Key Points

Patient Selection: Ideal for patients without blood disorders or infections.

Sterility: Maintain strict aseptic conditions during blood collection and PRF preparation.

Immediate Use: PRF should be used immediately after preparation to ensure maximum effectiveness.

Customization: Protocols can be adjusted based on specific clinical needs and patient conditions.

Monitoring: Follow up with patients to monitor healing progress and manage any complications.

Guidelines

Training and Competency: Ensure all personnel involved in the PRF protocol are adequately trained and competent in the procedure.

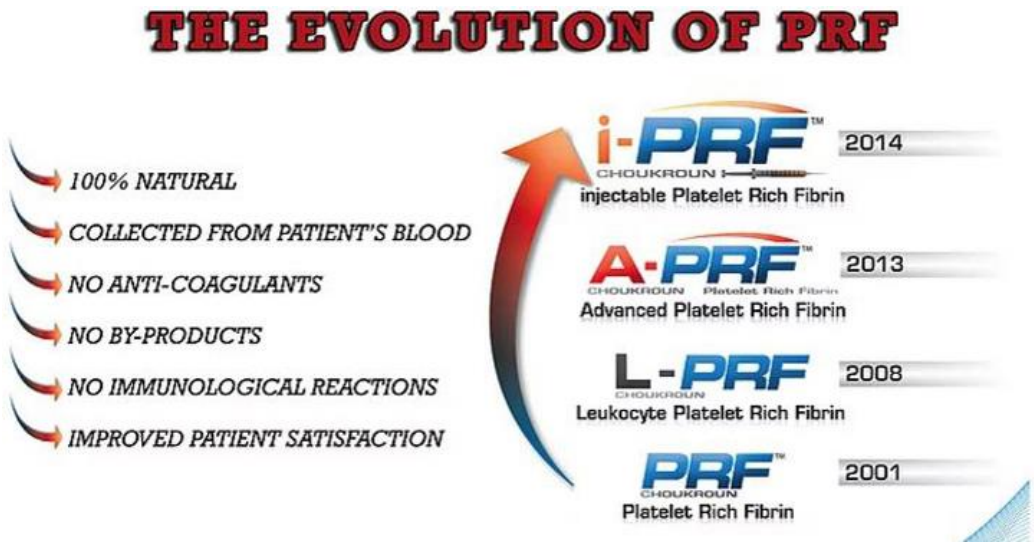
Equipment Maintenance: Regularly check and maintain centrifuges and other equipment to ensure proper functioning.

Patient Communication: Educate patients about the benefits, risks, and procedure of PRF therapy.

Documentation: Keep detailed records of the PRF preparation process, including centrifugation settings and patient information.

Safety Protocols: Follow safety guidelines to prevent contamination and ensure the quality of PRF, including the use of personal protective equipment (PPE) and sterile techniques.

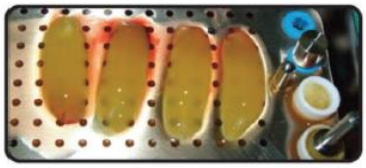
PRF is a valuable tool in regenerative medicine and dentistry, offering numerous benefits and wide-ranging applications with minimal risks. Proper adherence to protocols and guidelines ensures the effectiveness and safety of PRF treatments.

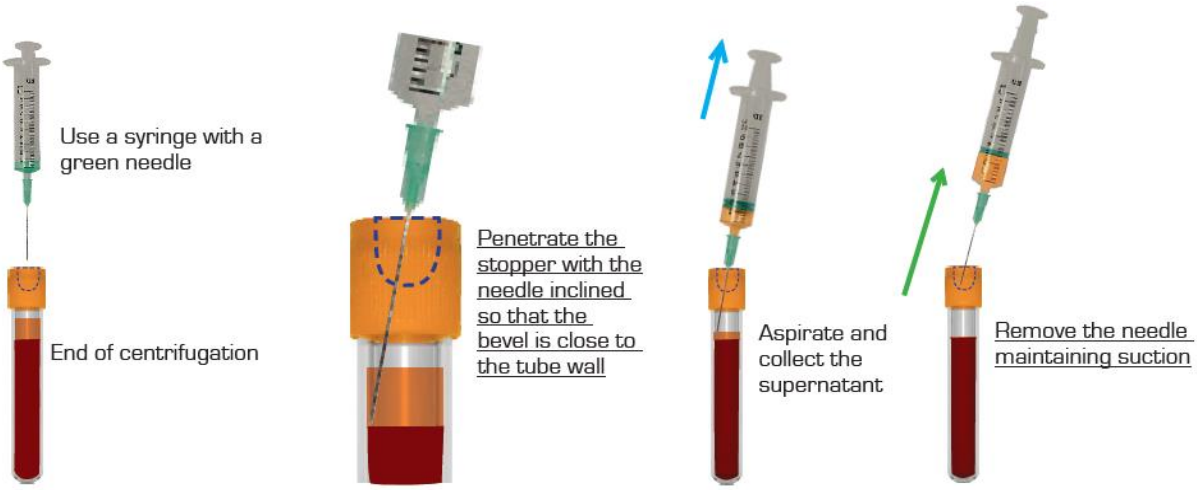


Various PRF	Centrifuge protocols
L-PRF	2700 rpm 12 mins
T-PRF	2700 rpm 12 mins
A-PRF	1500 rpm 14 mins
I-PRF	700 rpm 3-4 mins
CGF	2400 -2700rpm 12 mins
AFG	2400-2700 rpm 2 mins

- To separate easily the fibrin clot from the red cells: Put the clot on the mini-tray covered with a gauze and use the closed scissors to peel off the red clot.

- Put the PRF clots on the BoX grid and cover them with the tray, then put the lid on (always).





36.Impression Taking Techniques

Open Tray Technique

Accuracy: Ensures precise capture of implant positions, especially useful for multiple or non-parallel implants.

Direct Transfer: Impression coping remains in the impression, maintaining the exact implant location.

Complex Cases: Ideal for complicated cases with angulated abutments or non-parallel implants.

Closed Tray Technique

Simplicity: Easier and faster to execute, preferred for single implants or straightforward cases.

Patient Comfort: Less intraoral manipulation, enhancing patient comfort.

Convenience: Impression coping remains in the mouth, simplifying the process for the clinician.

Intraoral Scanner Technique

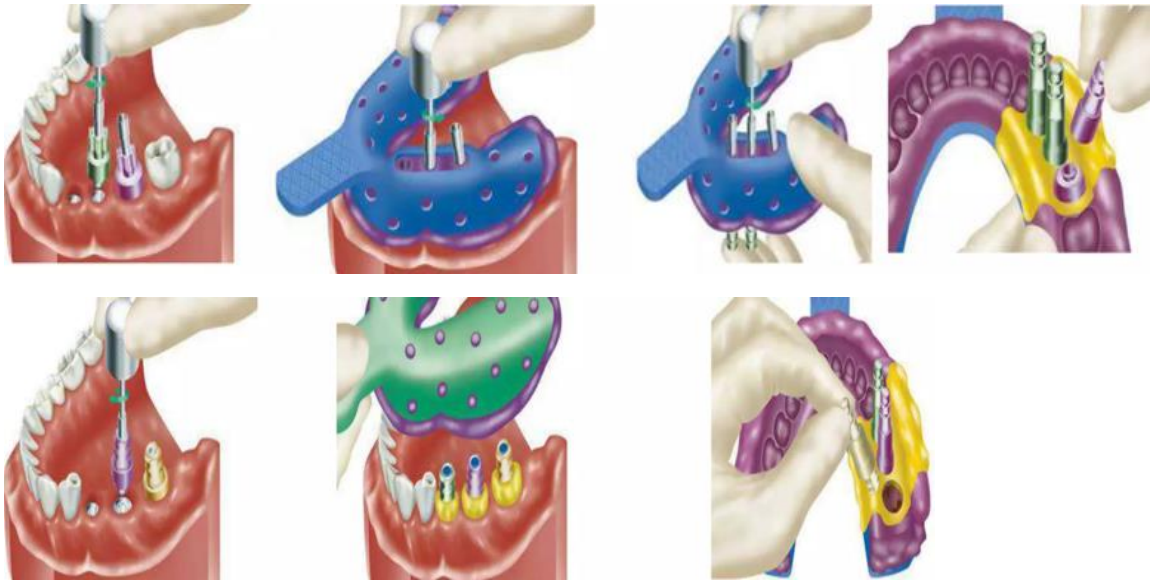
Digital Precision: Provides highly accurate digital impressions, reducing errors associated with traditional materials.

Efficiency: Faster and often more comfortable for patients, with real-time feedback and fewer retakes.

Integration: Easily integrates with CAD/CAM systems for immediate digital workflow, improving turnaround time for restorations.

Non-invasive: Eliminates the need for impression materials, enhancing patient experience and hygiene.

Each technique has its advantages depending on the clinical scenario, the number and angulation of implants, the complexity of the case, and the technology available to the clinician.



37.Implant Crown Delivery

Occlusal Adjustment: Ensure proper occlusion to prevent overloading the implant. Adjust the crown to achieve balanced contact in centric and excursive movements.

Passive Fit: Verify that the crown fits passively on the abutment or implant without causing stress or strain, which can lead to complications.

Marginal Integrity: Check the margins of the crown for a precise fit to prevent bacterial infiltration and ensure periodontal health.

Soft Tissue Health: Assess and manage the peri-implant soft tissues to ensure they are healthy and well-contoured around the crown.

Cementation: If using a cement-retained crown, ensure complete removal of excess cement to avoid peri-implantitis. Alternatively, consider screw-retained crowns for easier maintenance.

Aesthetics: Evaluate the crown for proper color, shape, and alignment to achieve a natural and pleasing appearance.

Radiographic Verification: Take a radiograph to confirm the correct seating of the crown and to check for any gaps or misfit.

Patient Instructions: Educate the patient on proper oral hygiene practices and the importance of regular follow-up visits to maintain the health of the implant and surrounding tissues.

Provisionalization: Consider using a provisional crown to shape the gingival tissue and evaluate aesthetics and function before delivering the final crown.

Follow-up: Schedule follow-up appointments to monitor the implant and crown, ensuring long-term success and addressing any issues promptly.

38.Contraindications

Uncontrolled Diabetes: Patients with uncontrolled diabetes have impaired healing abilities, increasing the risk of implant failure due to poor osseointegration. Example: A patient with an HbA1c level above 8% is typically not considered an ideal candidate until their diabetes is better managed.

Severe Osteoporosis: This condition weakens bones, making it difficult for the implant to achieve stable integration. Example: A patient taking long-term bisphosphonates for osteoporosis may have compromised bone quality, posing a higher risk for implant complications.

Active Periodontal Disease: Ongoing gum disease can lead to infection and bone loss around the implant site. Example: A patient with untreated periodontitis should first undergo periodontal therapy before considering implant placement.

Heavy Smoking: Smoking affects blood flow and healing, increasing the risk of implant failure. Example: A patient who smokes more than 10 cigarettes a day may be advised to quit smoking to improve implant success rates.

Certain Medications: Medications like corticosteroids or immunosuppressants can impair healing and immune response. Example: A patient on long-term corticosteroid therapy for rheumatoid arthritis may face increased risks during the healing phase of implant treatment.

Insufficient Bone Density or Volume: Adequate bone is necessary to support the implant. Example: A patient with significant bone loss in the jaw due to prolonged tooth loss might need bone grafting before implant placement.

Radiation Therapy to the Jaw: Previous radiation can damage bone and soft tissue, complicating healing. Example: A patient who has undergone radiation therapy for head and neck cancer may have compromised tissue health, making implant placement challenging.

Poor Oral Hygiene: Good oral hygiene is essential for implant maintenance. Example: A patient with a history of poor oral hygiene and recurrent dental infections may be at higher risk for implant failure unless their oral care habits improve.

39.Bone Level Implant vs. Tissue Level Implant

Bone Level Implants

Placement: These implants are positioned at the level of the bone, typically below the gum line.

Design: They have a conical or cylindrical shape with a rough surface to promote osseointegration (bonding with bone).

Advantages:

Improved aesthetic outcomes due to better alignment with the gum line.

Greater flexibility in restorative options, allowing for different abutments and crowns.

Better for cases with limited vertical bone height.

Disadvantages:

Requires precise surgical technique to avoid complications.

May be associated with higher risk of peri-implantitis if not properly maintained.

Tissue Level Implants

Placement: These implants are placed at the level of the soft tissue, with the top of the implant positioned above the gum line.

Design: Typically, they have a smooth collar that extends above the gum line, reducing bacterial colonization.

Advantages:

Simpler surgical procedure with potentially lower risk of infection due to reduced bacterial infiltration.

Often used in the posterior regions where aesthetics are less critical.

Easier to clean and maintain due to the collar design.

Disadvantages:

May present aesthetic challenges, particularly in the anterior region where gum line aesthetics are important.

Limited restorative flexibility compared to bone level implants.

Summary

Bone level implants offer better aesthetic outcomes and flexibility but require precise placement and maintenance. Tissue level implants are easier to place and maintain but may not provide the same aesthetic results, particularly in visible areas. The choice between these implants depends on the specific clinical scenario, patient needs, and aesthetic considerations.

40.Platform Switching vs. Platform Matching

Platform Switching

Concept: Involves using an abutment that is narrower than the diameter of the implant platform.

Design: The abutment-implant junction is shifted inward, creating a horizontal offset.

Advantages:

Reduces bone resorption around the implant neck by minimizing the bacterial load and mechanical stress at the bone-implant interface. Enhances soft tissue stability and preservation, contributing to better long-term aesthetic outcomes. Promotes peri-implant bone preservation, which is crucial for the longevity of the implant.

Disadvantages:

May require careful planning and selection of compatible components. Limited availability of compatible abutments and components from some manufacturers.

Platform Matching

Concept: Involves using an abutment with the same diameter as the implant platform.

Design: The abutment-implant junction aligns directly with the implant platform.

Advantages:

Simpler to plan and execute, with readily available components. Commonly used and well-documented in clinical practice. Easier to understand and implement without specialized training.

Disadvantages:

Higher risk of bone resorption around the implant neck due to micro-gaps and bacterial colonization at the implant-abutment interface. May lead to increased mechanical stress at the bone-implant junction, potentially compromising implant stability over time.

Summary: Platform switching helps preserve peri-implant bone and soft tissue by reducing stress and bacterial load at the bone-implant interface, offering better long-term aesthetic outcomes. Platform matching is simpler and more commonly used but may result in higher bone resorption and less favorable long-term stability. The choice between these approaches depends on clinical goals, patient-specific factors, and available implant components.

41.Hex vs. Non-Hex

Hex Implants

Clinical Applications:

- **General Use:** Commonly used in a wide range of dental implant procedures due to their long history of success and extensive availability of compatible components.
- **Restorative Procedures:** Preferred for cases requiring robust anti-rotation stability, such as single-tooth restorations and multi-unit bridges.
- **Prosthetic Versatility:** Ideal for situations where a broad range of prosthetic options and components are needed, accommodating diverse patient needs and clinical scenarios.

Advantages:

- Well-established with proven track records.
- Good anti-rotation stability, reducing the risk of abutment loosening.
- Wide compatibility with various prosthetic components.

Non-Hex Implants

Clinical Applications:

- **Advanced Procedures:** Suitable for cases requiring enhanced stability and reduced micro-movement, such as in patients with poor bone quality or complex restorations.
- **Peri-implant Health:** Beneficial in situations where a better seal against bacterial infiltration is crucial to prevent peri-implantitis and other complications.
- **Load Distribution:** Ideal for cases needing even distribution of mechanical forces, which can reduce stress on the implant and surrounding bone, especially in full-arch restorations or areas with high occlusal loads.

Advantages:

- Improved stability and reduced micro-movement at the implant-abutment interface.
- Better bacterial seal, potentially lowering the risk of peri-implantitis.
- More even distribution of mechanical forces, reducing implant and bone stress.

42.Implant Fixtures with or without Mount

Implant Fixtures with Mount:

Clinical Applications:

- **Standard Procedures:** Commonly used in routine dental implant surgeries where straightforward placement and alignment are sufficient.
- **Initial Stability:** Beneficial for cases requiring immediate placement stability, as the mount aids in securing the implant during insertion.
- **Training and Education:** Ideal for training purposes, helping practitioners achieve accurate placement and alignment.

Advantages:

- Provides a guide for accurate implant placement, enhancing initial stability.
- Facilitates easier handling and positioning during surgery.
- Useful for less experienced practitioners or in educational settings.

Disadvantages:

- The mount must be removed after initial placement, adding an extra step in the procedure.
- May limit visibility and access in certain clinical scenarios.

Implant Fixtures without Mount:

Clinical Applications:

- **Advanced and Complex Cases:** Suitable for complex or advanced implant procedures where precise customization and flexibility are required.
- **Limited Access Areas:** Ideal for areas with restricted access or visibility, such as posterior regions or narrow ridges.
- **Immediate Loading:** Often used in immediate loading protocols where the implant must be immediately functional after placement.

Advantages:

- Greater flexibility and control during placement, allowing for customization to individual patient anatomy.
- Reduced procedural steps, as there is no need to remove a mount.
- Enhanced visibility and access in challenging clinical scenarios.

Disadvantages:

- Requires higher skill level and experience for accurate placement.
- May lack the initial stability provided by mounted implants, depending on the clinical situation.

43.Verification Jig

Verification Jig

Purpose: A verification jig is a custom-made device used to ensure the accuracy and alignment of dental implants before the final prosthesis fabrication.

Design: Typically constructed from materials like acrylic resin or metal, the jig replicates the positions of the implants as determined during the initial planning phase.

Functions and Benefits

Accuracy: Ensures the precise transfer of the implant positions from the patient's mouth to the dental lab, reducing errors in the final prosthesis.

Alignment Check: Verifies that the implants are correctly aligned and parallel, which is crucial for the success and longevity of the implant-supported prosthesis.

Fit Assessment: Confirms the passive fit of the framework on the implants, preventing stress on the implants and surrounding bone.

Correction Identification: Identifies any discrepancies or misalignments early in the process, allowing for corrections before the final prosthesis is made.

Improved Outcomes: Contributes to better clinical outcomes by ensuring that the final prosthesis fits accurately, enhancing comfort, function, and aesthetics for the patient.

Usage Process

Initial Placement: After implant placement, an impression is taken, and a master cast is created.

Jig Fabrication: The verification jig is fabricated based on the master cast.

Clinical Try-In: The jig is placed in the patient's mouth to verify the accuracy of implant positions and alignment.

Adjustment: Any necessary adjustments are made to the jig or the implant positions.

Final Prosthesis: Once accuracy is confirmed, the final prosthesis is fabricated based on the verified positions.

Considerations

Material Choice: The material of the jig should be rigid and stable to ensure accurate verification.

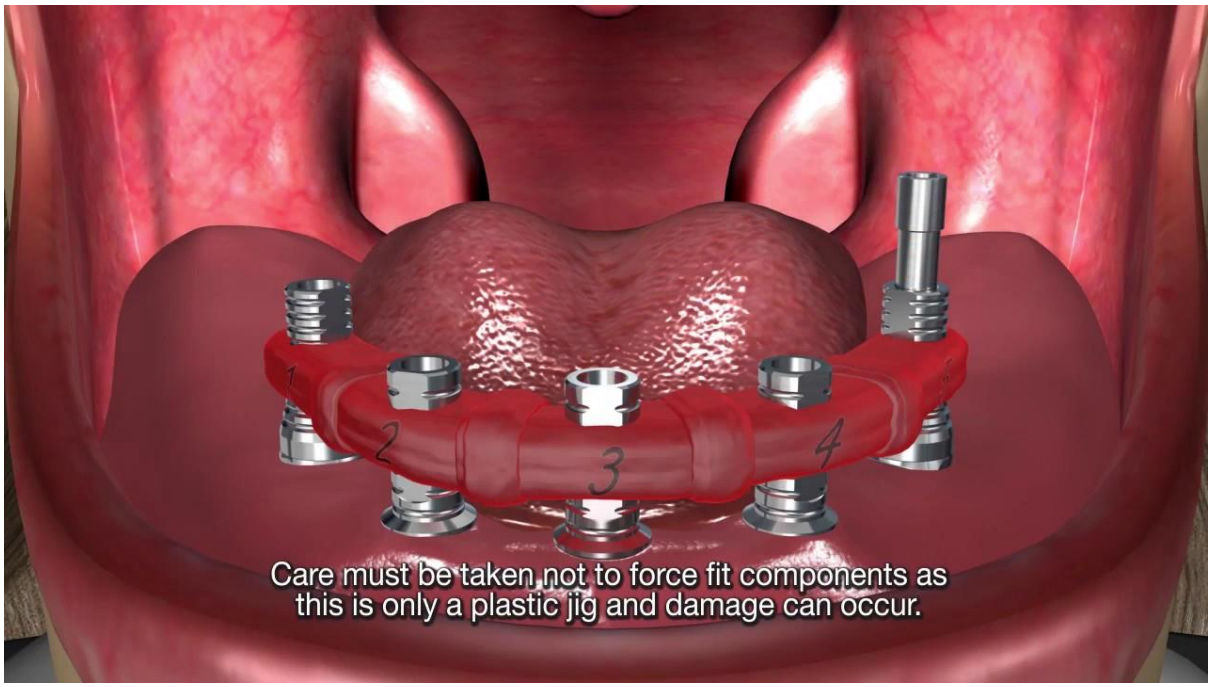
Clinical Skill: Proper use of the verification jig requires clinical expertise to interpret the fit and make necessary adjustments.

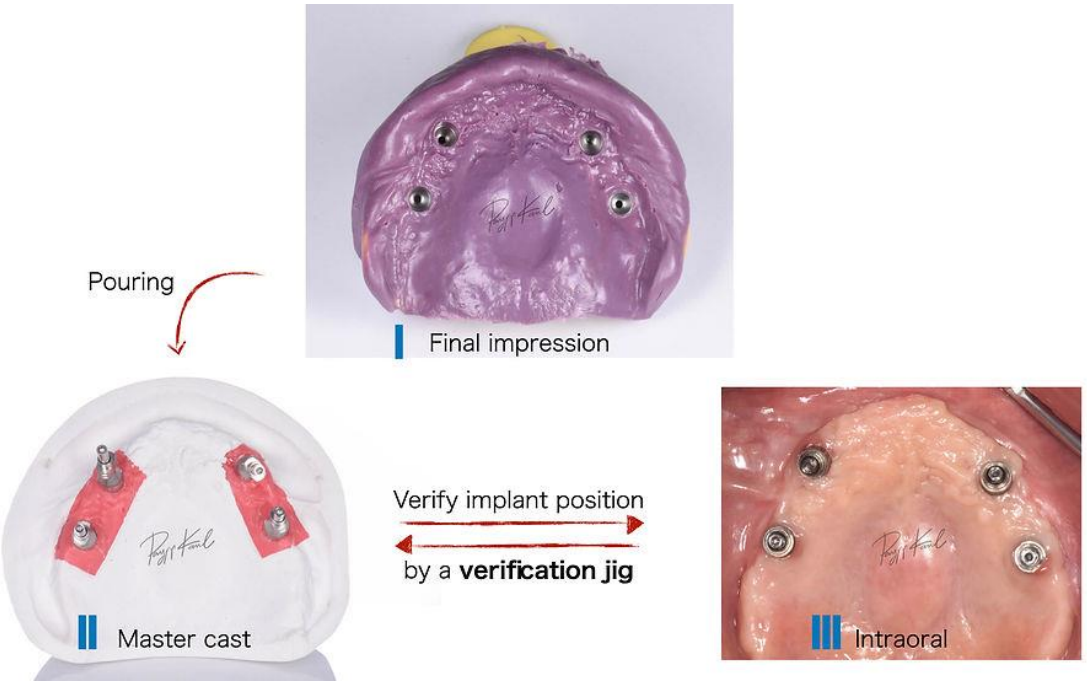
Time and Cost: Using a verification jig can add to the overall treatment time and cost but is often justified by the improved accuracy and outcomes.

Summary

A verification jig is a crucial tool in dental implantology used to ensure the precise alignment and fit of dental implants before fabricating the final prosthesis. It improves clinical outcomes

by verifying implant positions, ensuring passive fit, and identifying discrepancies early, contributing to enhanced accuracy, function, and aesthetics of the implant-supported prosthesis.





44.Multi-Unit Abutment System

Purpose: A multi-unit abutment system is used to support and stabilize dental prostheses, especially in cases involving multiple implants, such as full-arch restorations.

Design: These abutments connect dental implants to the final prosthesis, allowing for angulation correction and improved prosthetic fit.

Functions and Benefits

- **Angulation Correction:** Can correct implant angulations up to 45 degrees, ensuring optimal alignment of the prosthesis.
- **Improved Access:** Facilitates easier access for oral hygiene and maintenance, enhancing the long-term health of the implants.
- **Load Distribution:** Distributes occlusal forces evenly across the implants, reducing stress on individual implants and surrounding bone.
- **Versatility:** Suitable for various prosthetic designs, including screw-retained and cement-retained restorations.
- **Ease of Prosthesis Retrieval:** Allows for easy removal and replacement of the prosthesis for maintenance or repair, improving patient convenience and prosthesis longevity.

Usage Process

1. **Implant Placement:** Implants are placed in the jawbone based on the treatment plan.
2. **Selection and Placement:** Multi-unit abutments are selected based on the angulation and prosthetic requirements, then attached to the implants.
3. **Impression Taking:** An impression is taken to capture the precise position and angulation of the multi-unit abutments.
4. **Prosthesis Fabrication:** The final prosthesis is fabricated in the dental lab, tailored to the patient's specific needs.
5. **Prosthesis Attachment:** The final prosthesis is attached to the multi-unit abutments, ensuring a secure and stable fit.

Considerations

- **Surgical Skill:** Proper placement and selection of multi-unit abutments require surgical expertise.
- **Cost:** Multi-unit abutments and associated components may add to the overall cost of the implant treatment.
- **Prosthetic Design:** The choice of abutment system should align with the desired prosthetic design and patient-specific factors.

Summary: Multi-unit abutment systems are essential in dental implantology for supporting and stabilizing multiple implants, particularly in full-arch restorations. They offer angulation correction, improved access for hygiene, even load distribution, and ease of prosthesis retrieval. Their use enhances prosthetic fit and long-term implant success, though it requires surgical expertise and may increase treatment costs.

45.Submerged vs. Non-submerged

Submerged Implants

Concept: Also known as two-stage implants, these implants are completely covered by the gum tissue during the initial healing phase.

Procedure:

Stage 1: The implant is placed into the bone and the gum tissue is sutured over it, completely covering the implant.

Stage 2: After a healing period (typically several months), a second surgery is performed to expose the implant and attach an abutment.

Advantages:

Enhanced Osseointegration: The implant is protected from external forces and bacterial contamination during the healing phase, promoting better integration with the bone.

Reduced Risk of Infection: The closed healing environment minimizes the risk of bacterial invasion and subsequent infection.

Improved Aesthetics: Submerged healing allows for more control over soft tissue management, which can enhance the final aesthetic outcome.

Disadvantages:

Two Surgeries Required: The need for a second surgical procedure to uncover the implant can increase patient discomfort and treatment time.

Extended Treatment Time: The overall duration of treatment is longer compared to non-submerged implants.

Cost: Additional surgery and appointments may increase the overall cost of treatment.

Non-Submerged Implants

Concept: Also known as one-stage implants, these implants extend through the gum tissue at the time of initial placement, eliminating the need for a second surgery.

Procedure:

Single Stage: The implant is placed so that the top of the implant (or a healing abutment) protrudes through the gum tissue, allowing immediate access.

Advantages:

Reduced Treatment Time: The one-stage approach eliminates the need for a second surgical procedure, shortening the overall treatment timeline.

Patient Convenience: Fewer surgical procedures mean less patient discomfort and fewer appointments.

Immediate Loading: In some cases, non-submerged implants can be loaded with a temporary prosthesis immediately after placement, providing quicker functional and aesthetic results.

Disadvantages:

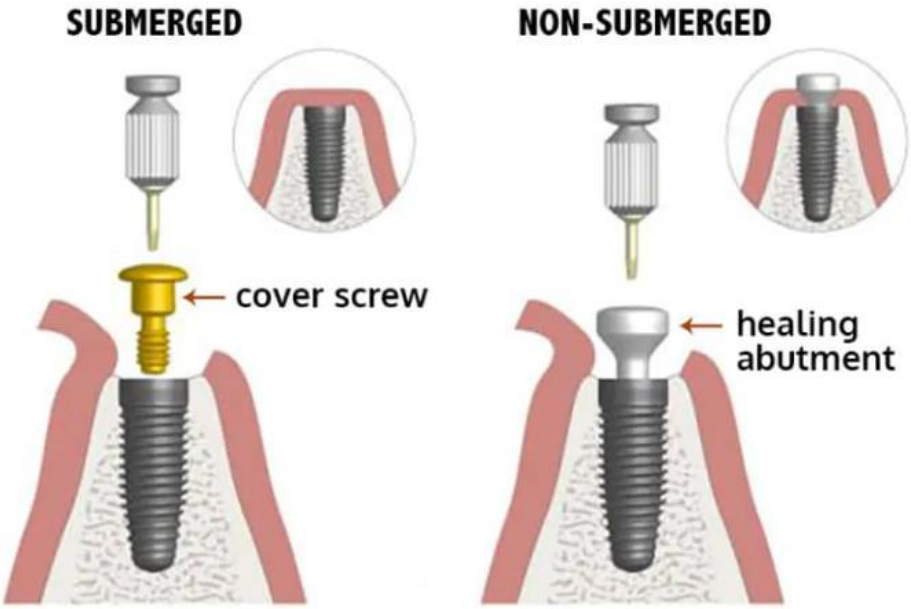
Exposure to External Forces: The implant is exposed to potential external forces and bacterial contamination during the initial healing phase, which can affect osseointegration.

Soft Tissue Management: Managing the soft tissue around the exposed implant can be more challenging, potentially affecting the final aesthetic outcome.

Increased Risk of Infection: The exposed implant is more susceptible to bacterial invasion, increasing the risk of peri-implantitis.

Summary

Submerged implants involve a two-stage process with initial implant coverage for enhanced osseointegration and reduced infection risk, but require longer treatment time and additional surgery. Non-submerged implants use a one-stage process, offering reduced treatment time and patient convenience, but with higher risks of exposure to external forces and infection. The choice depends on clinical goals, patient preferences, and specific case requirements.



A submerged implant (with a cover screw) requires an additional minor gum surgery to expose the implant and have a healing abutment which allows the gums to heal around

46.Broken Screw Removal

Broken Screw Removal Techniques:

When a screw in a dental implant breaks, it can be a challenging issue to address. Several techniques and tools are used to remove the broken screw without damaging the implant or surrounding structures.

Techniques:

Reverse Torque Technique:

Method: A high-torque wrench is used to apply reverse torque to the remaining part of the screw.

Advantages: Effective if the screw is not too tightly lodged.

Disadvantages: Risk of damaging the internal threads of the implant if excessive force is applied.

Ultrasonic Vibration:

Method: Ultrasonic devices are used to create vibrations that loosen the screw fragments.

Advantages: Minimizes risk of damaging the implant and surrounding bone.

Disadvantages: Requires specialized equipment and expertise.

Screw Removal Kit:

Method: Specialized kits include drills, taps, and extractors designed for removing broken screws.

Advantages: Provides a systematic approach with tools specifically designed for the task.

Disadvantages: Can be time-consuming and requires precision to avoid damaging the implant.

Slot Creation Technique:

Method: A small slot is created on the broken screw head using a high-speed bur, allowing engagement with a flathead screwdriver.

Advantages: Simple and cost-effective.

Disadvantages: Requires steady hand and precision to avoid damaging the implant.

Laser Technique:

Method: Laser energy is used to create micro-explosions that dislodge the screw fragments.

Advantages: Minimally invasive and precise.

Disadvantages: Requires specialized laser equipment and training.

Chemomechanical Methods:

Method: Chemical agents are applied to corrode or dissolve the screw, followed by mechanical removal.

Advantages: Can be effective for severely lodged screws.

Disadvantages: Risk of chemical damage to the implant and surrounding tissues.

Considerations:

Assessment: Thorough assessment of the screw and implant condition is crucial before attempting removal.

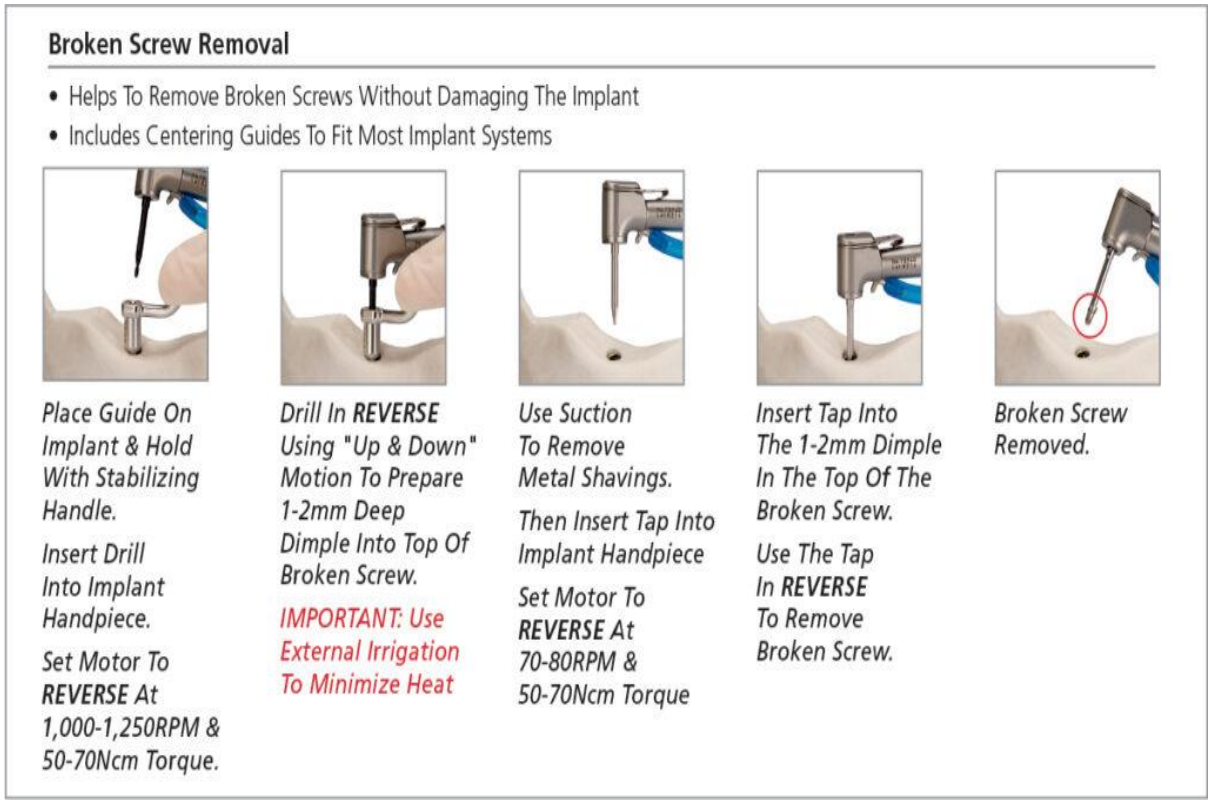
Preservation: Priority is given to preserving the integrity of the implant and surrounding bone.

Skill Level: Some techniques require advanced surgical skills and specialized equipment.

Follow-Up: Post-removal, the implant site may need additional treatment, such as bone grafting or a new abutment.

Summary:

Removing a broken screw in implant dentistry involves various techniques, including reverse torque, ultrasonic vibration, specialized removal kits, slot creation, laser methods, and chemomechanical approaches. Each method has its advantages and disadvantages, and the choice of technique depends on the specific case, available equipment, and clinician expertise. The primary goal is to remove the broken screw while preserving the integrity of the implant and surrounding structures.



47.Treatment of Peri-Implant Dieases

Peri-Implant Diseases:

Peri-implant diseases are inflammatory conditions affecting the tissues around dental implants. They include peri-implant mucositis (inflammation of the mucosa) and peri-implantitis (inflammation with bone loss).

Treatment Strategies:

Peri-Implant Mucositis:

Mechanical Debridement:

Method: Non-surgical cleaning using hand instruments, ultrasonic scalers, and air abrasives to remove plaque and calculus.

Advantages: Reduces inflammation and bacterial load.

Disadvantages: May require multiple sessions for effectiveness.

Antimicrobial Therapy:

Method: Application of local antiseptics (e.g., chlorhexidine) or systemic antibiotics.

Advantages: Enhances reduction of bacterial load.

Disadvantages: Potential for antibiotic resistance and side effects.

Laser Therapy:

Method: Use of lasers (e.g., diode, Nd) to decontaminate implant surfaces and surrounding tissues.

Advantages: Minimally invasive with bactericidal effects.

Disadvantages: Requires specialized equipment and training.

Photodynamic Therapy (PDT):

Method: Combining a photosensitizing agent with light to kill bacteria.

Advantages: Effective adjunctive treatment with minimal side effects.

Disadvantages: Requires specific materials and light sources.

Peri-Implantitis:

Non-Surgical Treatment:

Mechanical Debridement and Antimicrobials: Similar to peri-implant mucositis but often less effective alone in advanced cases.

Laser and PDT: Used as adjuncts to enhance decontamination.

Surgical Treatment:

Open Flap Debridement:

Method: Surgical exposure of the implant surface for thorough cleaning and decontamination.

Advantages: Direct access for complete debridement.

Disadvantages: More invasive with longer recovery.

Resective Surgery:

Method: Removal of diseased tissues and recontouring of bone.

Advantages: Reduces pocket depths and facilitates oral hygiene.

Disadvantages: Loss of bone structure and potential aesthetic concerns.

Regenerative Surgery:

Method: Use of bone grafts, membranes, and growth factors to regenerate lost bone.

Advantages: Aims to restore bone structure and function.

Disadvantages: Complex procedure with variable outcomes.

Implant Surface Decontamination:

Methods: Chemical agents (e.g., citric acid), mechanical tools (e.g., titanium brushes), and laser treatments to clean implant surfaces.

Advantages: Essential for successful treatment and re-osseointegration.

Disadvantages: Varies in effectiveness depending on the method.

Supportive Therapy:

Maintenance: Regular follow-up and professional cleanings to prevent recurrence.

Oral Hygiene Instruction: Emphasizing effective home care practices to control plaque.

Summary:

Treatment of peri-implant diseases involves a combination of mechanical debridement, antimicrobial therapy, laser therapy, and photodynamic therapy for peri-implant mucositis. For peri-implantitis, both non-surgical and surgical interventions, including open flap debridement, resective and regenerative surgery, and implant surface decontamination, are employed. Regular maintenance and effective oral hygiene are crucial to prevent recurrence and ensure long-term success.

TABLE 1. Comparison of Peri-Implant Mucositis Versus Peri-Implantitis

PERI-IMPLANT MUCOSITIS	PERI-IMPLANTITIS
Inflamed mucosa	Inflamed mucosa
Bleeding index ≥2[6]	Positive bleeding on probing
May have suppuration	May have suppuration
No bone loss	Progressive bone loss
	Probing depth of ≥5 mm

48.Maintenance of Dental Implants

Importance of Maintenance: Proper maintenance of dental implants is crucial to ensure their longevity, functionality, and to prevent peri-implant diseases. Regular professional care and patient self-care are essential components of a successful maintenance program.

Professional Maintenance:

- **Regular Check-Ups:**
  - **Frequency:** Typically every 3-6 months, depending on the patient's risk factors and overall oral health.
  - **Purpose:** Monitor implant stability, evaluate soft tissue health, and detect early signs of peri-implant diseases.
- **Professional Cleaning:**
  - **Techniques:** Use non-abrasive instruments such as plastic or titanium scalers, ultrasonic devices with non-metal tips, and air polishers.
  - **Goal:** Remove plaque, calculus, and biofilm from the implant surface and surrounding tissues without damaging the implant or abutment.
- **Radiographic Evaluation:**
  - **Frequency:** Annually or as needed.
  - **Purpose:** Assess bone levels around the implants and detect any pathological changes.
- **Occlusal Analysis:**
  - **Purpose:** Ensure proper occlusion to avoid excessive stress on the implants, which can lead to mechanical complications or bone loss.
- **Treatment of Peri-Implant Diseases:**
  - **Early Intervention:** Address signs of peri-implant mucositis or peri-implantitis promptly with appropriate treatments.

Patient Self-Care:

- **Daily Oral Hygiene:**
  - **Brushing:** Use a soft-bristle toothbrush or an electric toothbrush with a non-abrasive toothpaste to clean around the implants.
  - **Interdental Cleaning:** Use interdental brushes, floss, or water flossers to clean between teeth and around implants.
  - **Mouthwash:** Consider using an antimicrobial mouthwash (e.g., chlorhexidine) as recommended by a dentist.
- **Dietary Considerations:**
  - **Avoid Hard Foods:** Reduce the risk of mechanical damage to the implants by avoiding excessively hard or sticky foods.
  - **Balanced Diet:** Maintain a balanced diet to support overall oral health and immune function.
- **Avoiding Harmful Habits:**
  - **Smoking:** Quit smoking as it increases the risk of peri-implant diseases and compromises healing.
  - **Bruxism:** Address bruxism (teeth grinding) with the use of night guards if necessary.
- **Patient Education:**

    - **Instruction:** Educate patients on the importance of maintaining oral hygiene and regular dental visits.
    - **Demonstration:** Show proper brushing and interdental cleaning techniques.
    - **Motivation:** Encourage and motivate patients to adhere to their maintenance schedule and self-care routines.

Follow-Up and Adjustments:

- **Personalized Maintenance Plan:** Develop a maintenance plan tailored to the patient's specific needs and risk factors.
- **Adjustments:** Make necessary adjustments to prosthetic components and occlusion as needed to ensure optimal implant function.
- **Regular Dental Check-Ups:** Schedule periodic visits to monitor the health of the implants, surrounding tissues, and overall oral hygiene.
- **Professional Cleaning:** Regular professional cleanings to remove plaque and calculus around implants, using instruments that prevent scratching the implant surface.
- **Home Care Regimen:**
    - **Brushing:** Use a soft-bristled toothbrush and non-abrasive toothpaste to clean around the implant and prosthetic components.
    - **Flossing:** Use implant-specific floss or interdental brushes to clean between implants and natural teeth.
    - **Antimicrobial Mouthwash:** Consider using an antimicrobial mouthwash to reduce bacterial load around the implants.
- **Monitoring Peri-Implant Health:** Assess peri-implant tissues for signs of inflammation, bleeding, or pocket formation, indicating peri-implant mucositis or peri-implantitis.
- **Occlusal Adjustment:** Regularly check and adjust occlusion to ensure even load distribution and prevent excessive stress on implants.
- **Radiographic Evaluation:** Periodic radiographs to monitor bone levels around the implants and detect early signs of bone loss or other complications.
- **Managing Complications:**
    - **Peri-Implant Mucositis:** Treat early signs of inflammation with improved oral hygiene and professional care.
    - **Peri-Implantitis:** Address more severe inflammation and bone loss with mechanical debridement, antimicrobial therapy, and possibly surgical intervention.
    - **Replacement of Prosthetic Components:** Regularly inspect and replace worn or damaged prosthetic components, such as abutments or crowns, to maintain function and aesthetics.
    - **Patient Education:** Educate patients about the importance of maintaining good oral hygiene and regular dental visits to ensure the longevity of their implants.
    - **Parafunctional Habit Management:** Provide occlusal guards or other interventions for patients with bruxism or other parafunctional habits to protect the implants.

49.Implant Crown Screw Loosening

Causes

Inadequate Torque: Insufficient tightening of the screw during placement.

Occlusal Forces: Excessive or improper distribution of biting forces on the crown.

Component Misfit: Poor fit between the implant components (abutment, crown, screw).

Micro-Movement: Small movements at the implant-abutment interface.

Wear and Fatigue: Material fatigue or wear over time.

Symptoms

Mobility of the crown.

Discomfort or pain.

Changes in occlusion (bite).

Peri-implantitis symptoms (swelling, redness around the implant).

Prevention

Proper Torque Application: Use torque wrench to apply manufacturer-recommended torque.

Regular Maintenance: Schedule regular check-ups to monitor implant and crown condition.

Accurate Component Fit: Ensure precise fit of all components during placement.

Occlusal Adjustment: Adjust occlusion to distribute forces evenly.

Quality Materials: Use high-quality, compatible components.

Management

Assessment: Examine the implant and crown for signs of loosening or damage.

Retightening: Retighten the screw to the recommended torque.

Replacement: Replace the screw or crown if necessary.

Occlusal Adjustment: Adjust the bite to reduce excessive forces.

Patient Education: Instruct patients on avoiding habits that can cause excessive force (e.g., teeth grinding).

Conclusion

Managing and preventing implant crown screw loosening is crucial for the longevity and functionality of dental implants. Proper technique, regular maintenance, and patient education play key roles in ensuring implant success.

50.Choosing an Implant System

Proven Track Record: Select an implant system with a well-documented history of clinical success and reliability.

Material Quality: Ensure the implants are made from high-quality, biocompatible materials such as titanium or zirconia.

Design Features: Look for features that enhance osseointegration and primary stability, such as surface texture and thread design.

Versatility: Choose a system that offers a wide range of sizes and configurations to accommodate various clinical scenarios and patient anatomies.

Ease of Use: Consider the simplicity and efficiency of the surgical protocol and restorative procedures.

Prosthetic Options: Ensure the system provides compatible prosthetic components for different types of restorations, including single crowns, bridges, and overdentures.

Research and Development: Prefer systems supported by ongoing research and innovation to stay current with advancements in implant technology.

Training and Support: Opt for systems backed by comprehensive training programs, clinical support, and continuing education opportunities.

Cost-effectiveness: Evaluate the overall cost, including the price of implants, prosthetic components, and associated instruments, while considering the balance between quality and affordability.

Manufacturer Reputation: Choose systems from reputable manufacturers known for their commitment to quality, customer service, and product availability.

Patient-specific Needs: Consider specific patient requirements, such as bone density, volume, and aesthetic demands, when selecting an implant system.

In summary, when choosing an implant system, prioritize clinical success, material quality, design features, versatility, ease of use, prosthetic options, ongoing research, training support, cost-effectiveness, manufacturer reputation, and patient-specific needs.

51.Considering Flap Design

Purpose: Flap design in dental implant treatment is crucial for providing adequate access to the implant site, ensuring proper healing, and minimizing complications.

Key Considerations:

1. Surgical Access:

- **Visibility and Access:** The flap design should allow clear visibility and access to the implant site, ensuring precise placement.
- **Exposure of Bone:** Ensure sufficient exposure of the alveolar bone while preserving critical anatomical structures.

2. Tissue Management:

- **Blood Supply:** Maintain adequate blood supply to the flap to promote healing and reduce the risk of necrosis.
- **Flap Thickness:** Consider the thickness of the flap to ensure it includes periosteum, enhancing stability and healing.

3. Flap Design Types:

- **Full-Thickness (Mucoperiosteal) Flap:** Commonly used to expose bone completely, providing excellent visibility and access.
- **Partial-Thickness Flap:** Involves raising only the mucosa, preserving periosteum; used when less bone exposure is needed.

4. Incision Placement:

- **Crestal Incisions:** Made along the alveolar ridge; ideal for single implants and cases with adequate keratinized tissue.
- **Paracrestal Incisions:** Placed slightly off the crest; useful in preserving keratinized tissue or when multiple implants are placed.

5. Flap Reflection and Handling:

- **Gentle Reflection:** Reflect the flap gently to avoid tearing and ensure it can be repositioned accurately.
- **Minimize Trauma:** Handle tissues carefully to minimize trauma and postoperative discomfort.

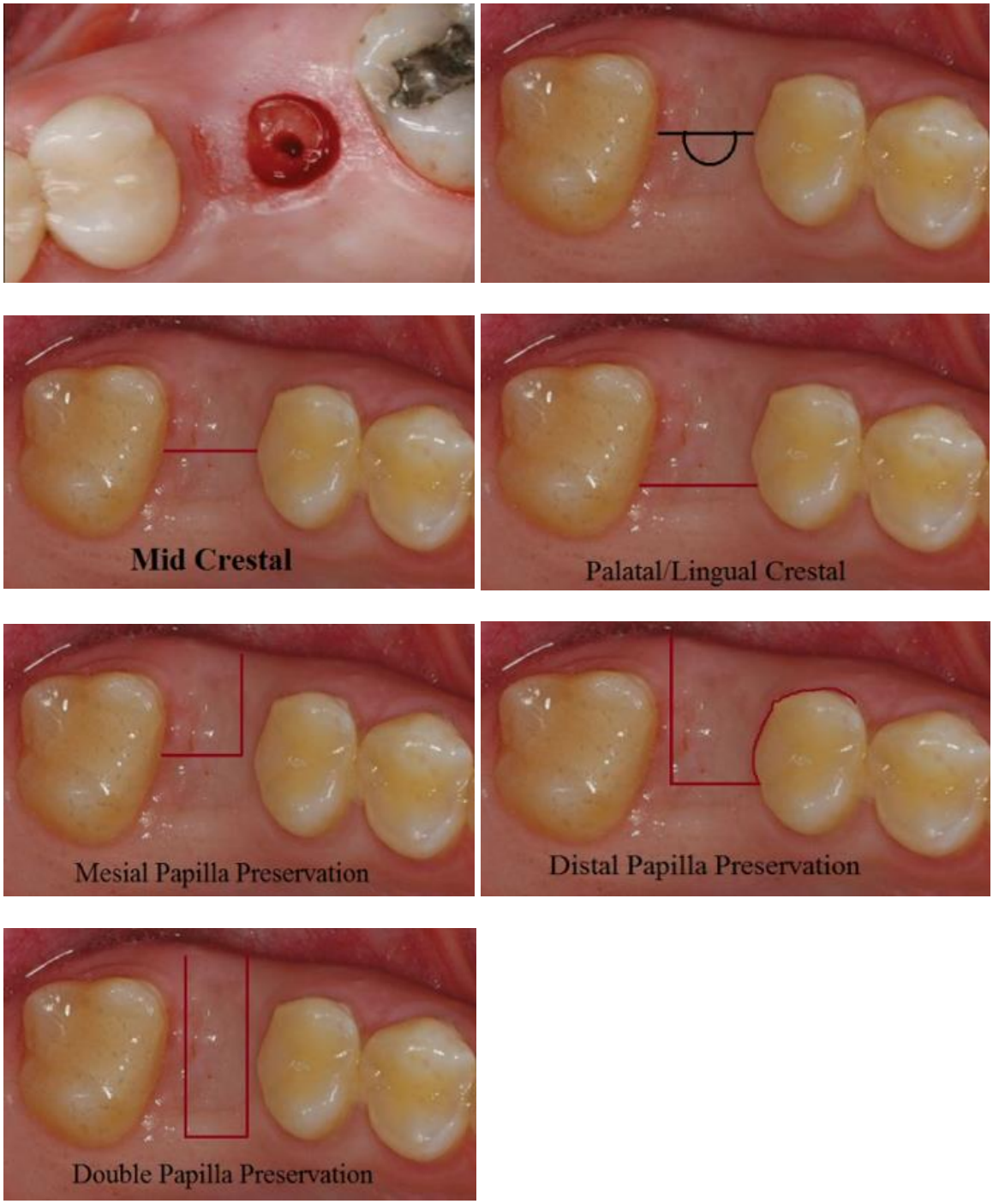
6. Suturing Techniques:

- **Primary Closure:** Aim for tension-free primary closure to promote optimal healing.
- **Suture Material:** Use appropriate suture materials to secure the flap and support healing.

7. Postoperative Considerations:

- **Healing Time:** Allow adequate healing time before loading the implant to ensure tissue integration.
- **Patient Care:** Provide clear postoperative care instructions to the patient to support healing and prevent infection.

Summary: Proper flap design in dental implant treatment ensures adequate surgical access, maintains tissue health, and promotes successful healing. Key considerations include surgical access, tissue management, incision placement, and gentle handling. The choice of flap design should be tailored to the specific clinical situation and patient needs to optimize outcomes.



52.Zygomatic Implants

Introduction: Zygomatic implants are a specialized type of dental implant designed for patients with severe maxillary bone loss. They are longer than traditional implants and anchor in the zygomatic bone (cheekbone), offering a stable foundation for dental prostheses.

Indications

- **Severe Maxillary Atrophy:** Ideal for patients with significant bone loss in the upper jaw where traditional implants cannot be placed.
- **Failed Bone Grafts:** Suitable for patients who have had unsuccessful bone grafting procedures.
- **Oncology Patients:** Used in patients with maxillary defects due to tumor resection.
- **Maxillofacial Trauma:** Effective for reconstructing the maxillary region following severe facial trauma.

Contraindications

- **Poor General Health:** Patients with uncontrolled systemic conditions (e.g., diabetes, cardiovascular diseases) may not be suitable candidates.
- **Inadequate Zygomatic Bone:** Insufficient bone quality or volume in the zygomatic region.
- **Severe Sinus Pathologies:** Active sinus infections or other severe sinus issues.
- **Psychological Factors:** Patients with psychological conditions that impair cooperation or understanding of the procedure.

Advantages

- **Immediate Function:** Allows for immediate loading and restoration, reducing treatment time.
- **Avoids Bone Grafting:** Eliminates the need for bone grafting procedures, which can be complex and time-consuming.
- **High Success Rate:** Demonstrates a high success rate, even in cases of severe bone loss.
- **Enhanced Stability:** Provides strong anchorage in the zygomatic bone, offering excellent stability for dental prostheses.

Disadvantages

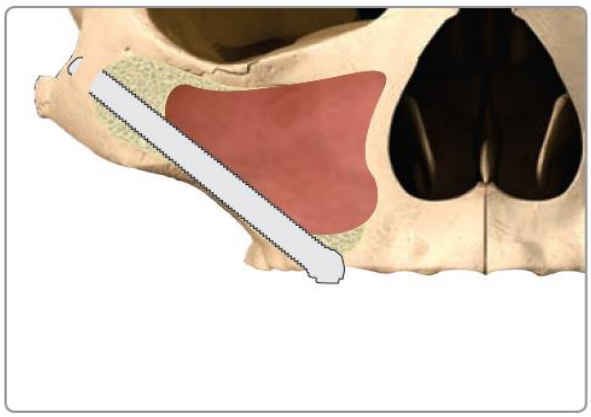
- **Complex Surgery:** Requires a high level of surgical expertise and experience.
- **Invasive Procedure:** More invasive than traditional implant procedures, with potential for increased morbidity.
- **Cost:** Generally more expensive due to the complexity of the surgery and specialized implants.
- **Postoperative Complications:** Higher risk of postoperative complications such as sinusitis or paresthesia.

Summary: Zygomatic implants provide a viable solution for patients with severe maxillary bone loss, allowing for immediate restoration and eliminating the need for bone grafting. While they offer significant advantages in stability and success rates, they also come with increased

complexity, cost, and potential complications. Careful patient selection and surgical expertise are essential for optimal outcomes.

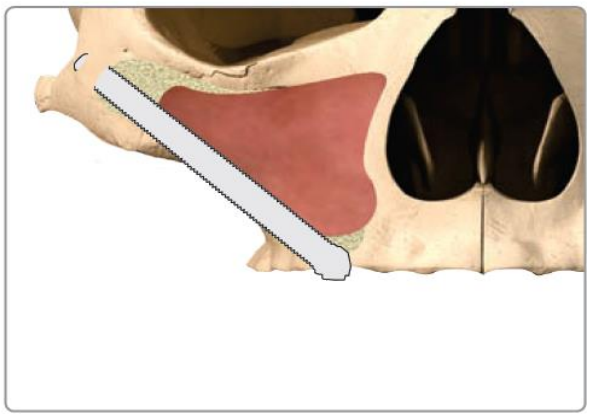
ZAGA TYPE 0 *(Classic Technique)*

The anterior maxillary wall is very flat. The implant head is located on the alveolar crest. The implant body has an intra-sinus path. The implant comes in contact with bone at the alveolar crest and zygoma, and sometimes at the internal side of the sinus wall.



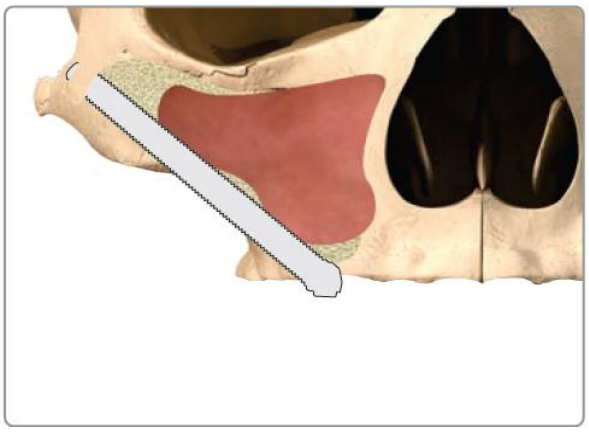
ZAGA TYPE 1 *(Classic or Sinus-slot Technique)*

The anterior maxillary wall is slightly concave. The implant head is located on the alveolar crest. The drill has performed the osteotomy slightly through the wall. Most of the implant body has an intra-sinus path. The implant comes in contact with bone at the alveolar crest, lateral sinus wall, and zygoma.



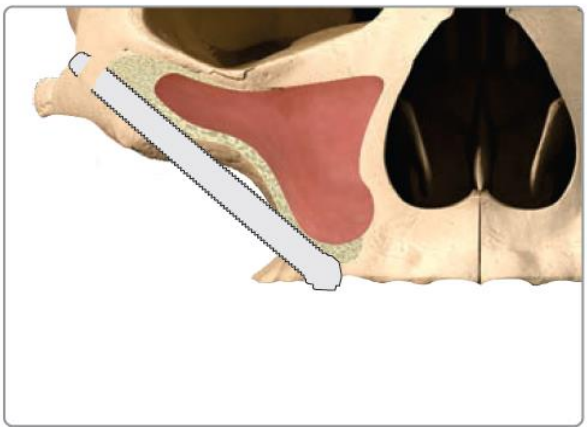
ZAGA TYPE 2 *(Sinus-slot or Exteriorized Technique)*

The anterior maxillary wall is concave. The implant head is located on the alveolar crest. The drill has performed the osteotomy through the wall and the implant can be seen through it and most of the body has an extra-sinus path. The implant comes in contact with bone at the alveolar crest, lateral sinus wall and zygoma.



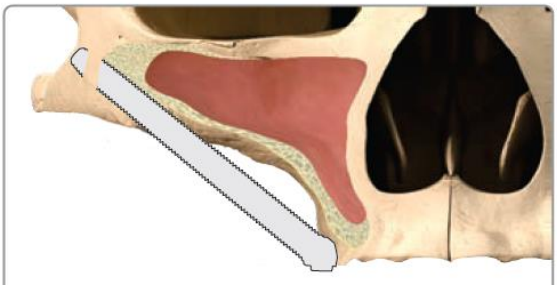
ZAGA TYPE 3 *(Exteriorized Technique)*

The anterior maxillary wall is very concave. The implant head is located on the alveolar crest. Most of the body has an extra-sinus path. The middle part of the implant body is not touching the most concave part of the wall. The implant contacts bone in the coronal alveolar and apical zygoma.



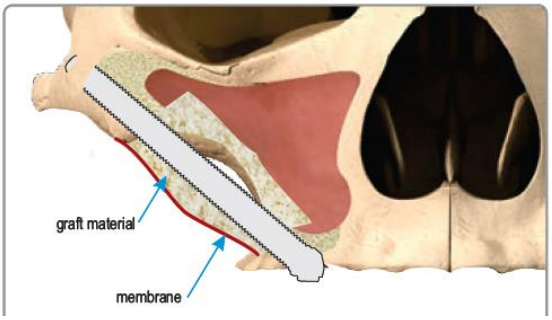
ZAGA TYPE 4 Resected Maxilla *(Extra-alveolar Technique)*

The maxilla and alveolar bone show extreme vertical and horizontal atrophy. The implant head is located buccally of the alveolar crest. There is no minimum osteotomy at this level. The drill has arrived at the apical zygomatic entrance following a path outside the sinus wall. The implant contacts bone in the zygoma and part of the lateral sinus wall.



TECHNIQUE of James Chow and others

Lateral wall of sinus displaced inwards, graft material and membrane used to encapsulate entire implant body.



53.Pterygoid Implants

Introduction: Pterygoid implants are specialized dental implants designed to anchor in the pterygoid region of the maxilla, providing an alternative solution for patients with severe posterior maxillary bone loss. These implants extend into the pterygoid plate, bypassing the need for sinus lifts or extensive bone grafting.

Indications:

- **Severe Posterior Maxillary Atrophy:** Ideal for patients with significant bone loss in the posterior maxilla where traditional implants cannot be placed.
- **Avoiding Sinus Lifts:** Suitable for patients who prefer to avoid sinus lift procedures.
- **Failed Traditional Implants:** For patients who have had unsuccessful traditional implant placements in the posterior maxilla.
- **Full-Arch Reconstructions:** Effective in cases requiring stable posterior support for full-arch prosthetic reconstructions.

Contraindications:

- **Poor General Health:** Patients with uncontrolled systemic conditions (e.g., diabetes, cardiovascular diseases) may not be suitable candidates.
- **Inadequate Pterygoid Bone:** Insufficient bone quality or volume in the pterygoid region.
- **Severe Anatomical Variations:** Significant anatomical deviations or pathologies in the pterygoid region.
- **Psychological Factors:** Patients with psychological conditions that impair cooperation or understanding of the procedure.

Advantages:

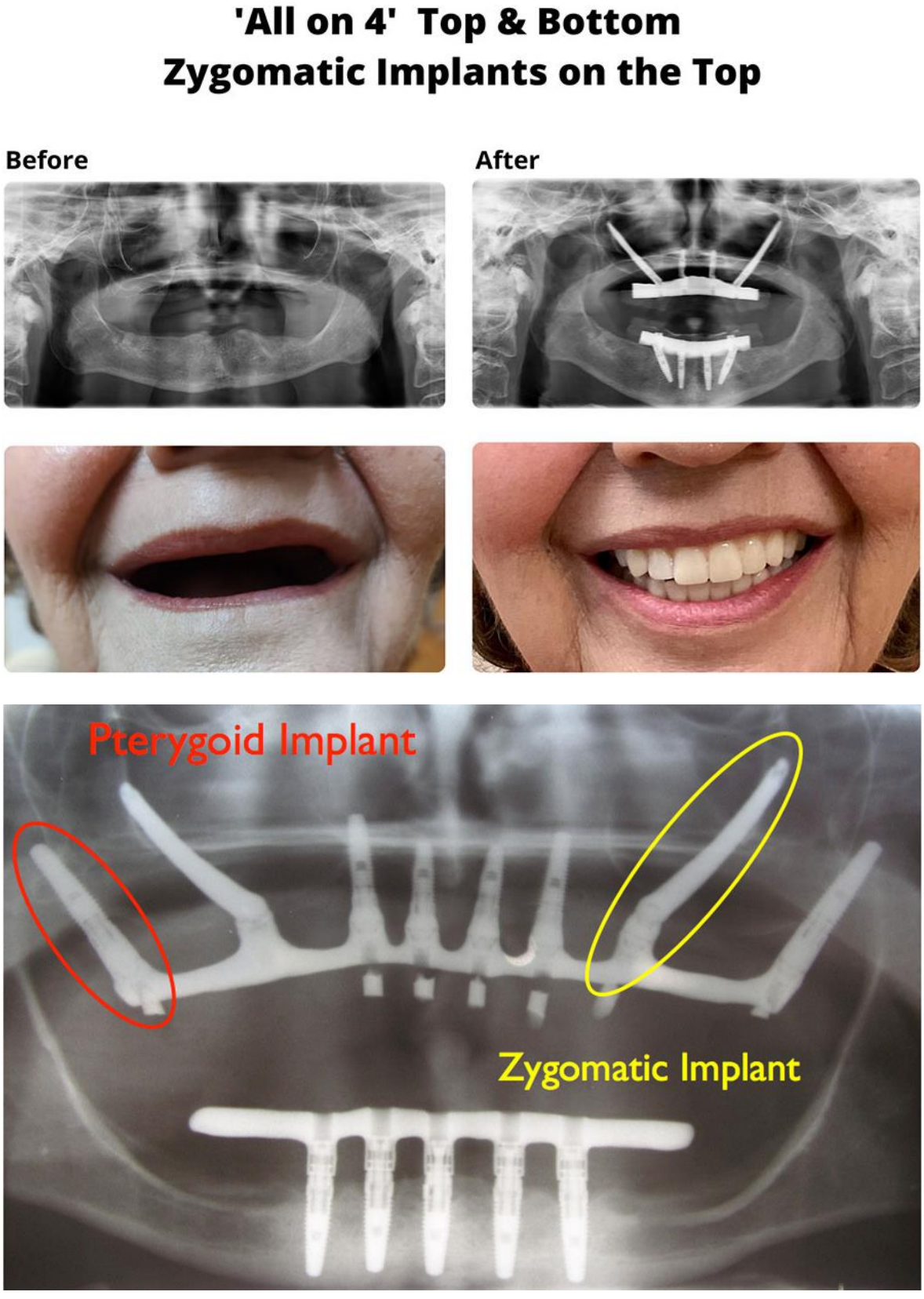
- **Avoids Sinus Augmentation:** Eliminates the need for sinus lift procedures, reducing treatment complexity and time.
- **Immediate Function:** Allows for immediate loading and restoration, enhancing patient satisfaction.
- **High Success Rate:** Demonstrates high success rates even in cases of severe bone loss.
- **Enhanced Stability:** Provides strong anchorage in the pterygoid region, offering excellent stability for posterior dental prostheses.

Disadvantages:

- **Complex Surgery:** Requires a high level of surgical expertise and experience.
- **Invasive Procedure:** More invasive than traditional implant procedures, with potential for increased morbidity.
- **Cost:** Generally more expensive due to the complexity of the surgery and specialized implants.
- **Postoperative Complications:** Higher risk of postoperative complications such as bleeding, infection, or nerve damage.

Summary: Pterygoid implants provide a reliable solution for patients with severe posterior maxillary bone loss, offering immediate restoration and avoiding sinus lift procedures. They

offer significant advantages in stability and success rates, but come with increased complexity, cost, and potential complications. Careful patient selection and surgical expertise are essential for optimal outcomes.



54.Basal Implants

Introduction: Basal implants, also known as cortical implants or bicortical implants, are a type of dental implant designed to be anchored in the basal or cortical bone, which is highly dense and less prone to resorption. These implants are particularly useful for patients with significant jawbone atrophy or those who want to avoid extensive bone grafting procedures.

Indications:

- **Severe Jawbone Atrophy:** Ideal for patients with significant bone loss in the maxilla or mandible where traditional implants are not feasible.
- **Immediate Loading:** Suitable for patients who require immediate loading of the implants with a fixed prosthesis.
- **Avoiding Bone Grafting:** Preferred for patients who want to avoid bone grafting or sinus lift procedures.
- **Full-Arch Reconstructions:** Effective for patients needing full-arch restorations where multiple implants are required for support.

Contraindications:

- **Poor General Health:** Patients with uncontrolled systemic conditions (e.g., diabetes, cardiovascular diseases) may not be suitable candidates.
- **Severe Periodontal Disease:** Active periodontal infections or severe periodontal disease may contraindicate implant placement.
- **Inadequate Bone Quality:** Poor quality or insufficient quantity of basal bone.
- **Psychological Factors:** Patients with psychological conditions that impair cooperation or understanding of the procedure.

Advantages:

- **Immediate Function:** Allows for immediate loading and restoration, enhancing patient satisfaction and reducing treatment time.
- **Avoids Bone Grafting:** Eliminates the need for extensive bone grafting procedures, reducing overall treatment complexity.
- **High Success Rate:** Demonstrates high success rates even in cases of severe bone loss.
- **Strong Stability:** Provides excellent stability due to anchorage in dense cortical bone.
- **Minimally Invasive:** Less invasive than traditional bone grafting procedures, leading to faster recovery times.

Disadvantages:

- **Complex Surgery:** Requires a high level of surgical expertise and precise technique.
- **Invasive Procedure:** Although less invasive than bone grafting, the procedure still involves significant surgical intervention.
- **Cost:** Generally more expensive due to the complexity of the surgery and specialized implants.
- **Postoperative Complications:** Risk of complications such as infection, implant failure, or nerve damage.

Summary: Basal implants offer a viable solution for patients with severe jawbone atrophy, allowing for immediate restoration and avoiding extensive bone grafting. They provide strong stability and high success rates but require specialized surgical expertise and come with potential risks and higher costs. Proper patient selection and surgical skill are essential for achieving optimal outcomes with basal implants.

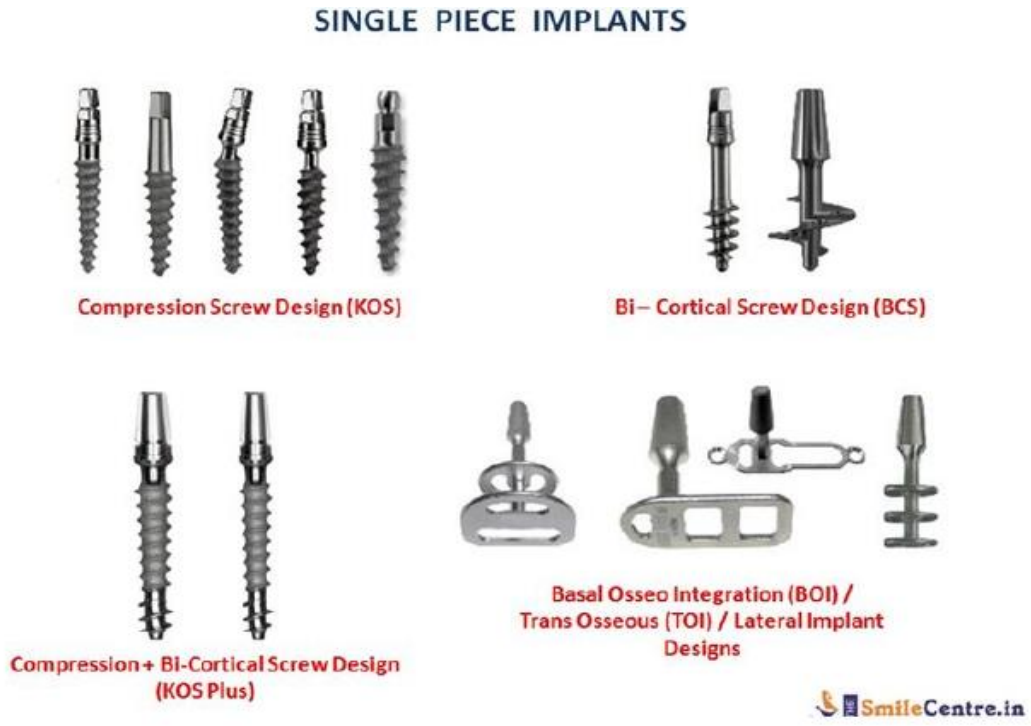


Fig. 1. Types of basal implants.

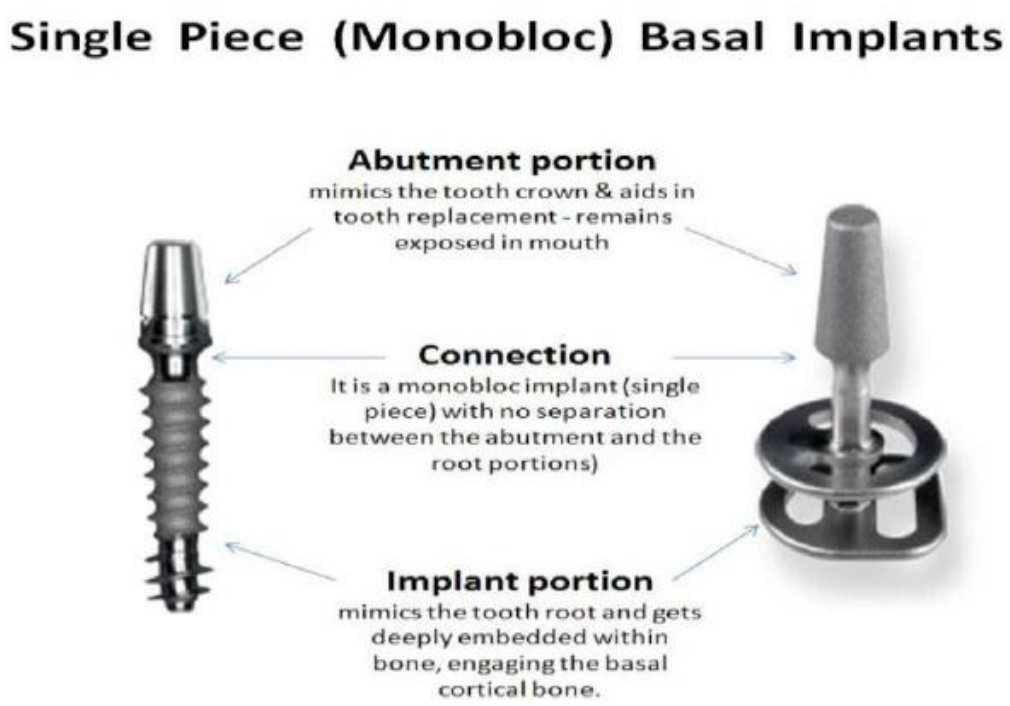


Fig. 2. Parts of basal implants[20].

55.Instructions to the Patients

Do's:

1. **Follow Post-Operative Care Instructions**: Adhere strictly to the care guidelines provided by your dental surgeon to ensure proper healing.
2. **Maintain Good Oral Hygiene**: Brush your teeth gently but thoroughly twice a day and use an antibacterial mouthwash as recommended.
3. **Keep Appointments**: Attend all scheduled follow-up appointments to monitor the healing process and ensure the implant is integrating well with the bone.
4. **Eat Soft Foods**: Stick to a diet of soft foods for the first few days after surgery to avoid putting stress on the implant site.
5. **Stay Hydrated**: Drink plenty of water to help keep your mouth clean and promote healing.
6. **Use Ice Packs**: Apply ice packs to the outside of your mouth to reduce swelling in the first 24 hours after surgery.
7. **Take Prescribed Medications**: Use any prescribed antibiotics and pain medications as directed by your dentist.

Don'ts:

1. **Avoid Smoking**: Smoking can impair healing and increase the risk of implant failure.
2. **Don't Consume Hard or Chewy Foods**: Refrain from eating hard, crunchy, or sticky foods that could disrupt the implant site.
3. **Avoid Excessive Physical Activity**: Do not engage in strenuous exercise or heavy lifting for a few days post-surgery to prevent complications.
4. **Don't Touch the Implant Site**: Avoid touching the surgical area with your fingers or tongue to prevent infection.
5. **Avoid Drinking Through a Straw**: The suction can dislodge the blood clot and impede healing.
6. **Don’t Use Harsh Mouth Rinses**: Avoid alcohol-based mouthwashes as they can irritate the surgical site.